

MOTOR VEHICLE SAFETY AND THE MARKETPLACE

HEARINGS

BEFORE THE

SUBCOMMITTEE ON SURFACE TRANSPORTATION

OF THE

COMMITTEE ON COMMERCE, SCIENCE,

AND TRANSPORTATION

UNITED STATES SENATE

NINETY-EIGHTH CONGRESS

FIRST SESSION

ON

MOTOR VEHICLE SAFETY AND THE MARKETPLACE: AUTO SAFETY AND
DURABILITY; OCCUPANT SAFETY; AND GOVERNMENT-INDUSTRY EF-
FORTS TO IMPROVE HIGHWAY SAFETY

FEBRUARY 17, MARCH 10, AND 11, 1983

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MOTOR VEHICLE SAFETY AND THE MARKET- PLACE: AUTO SAFETY AND DURABILITY

THURSDAY, FEBRUARY 17, 1983

U.S. SENATE,
SUBCOMMITTEE ON SURFACE TRANSPORTATION,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, D.C.

The subcommittee met, pursuant to notice, at 1:35 p.m., in room SR-253, Russell Senate Office Building, Hon. John C. Danforth (chairman of the subcommittee) presiding.

Staff members assigned to these hearings: Karen L. Borlaug, professional staff member and Loretta L. Dunn, minority-staff counsel.

OPENING STATEMENT BY SENATOR DANFORTH

Senator DANFORTH. Today we begin 3 days of hearings on motor vehicle safety and the marketplace. The purpose of these hearings will be to examine the state of the art in auto safety technology and to explore ways of expediting the availability of safety improvements to consumers.

These hearings come on the heels of a new Lou Harris survey widely publicized this morning which indicate that Americans believe they are paying too much for cheaply made, sometimes dangerous, products. The public commitment to strong safety standards is overwhelming. For example, 94 percent support Government approval of new drugs. While there is strong opposition to mindless Government regulation, Harris said, consumers want more, not less, Government regulation in the consumer protection area.

The automobile is one of our most important consumer products. It is an indispensable feature of our daily life. It is one of the most expensive consumer investments. It is also involved in more deaths and serious injuries than any other consumer product. Auto safety, therefore, is the leading consumer product safety issue in the United States.

Today we will focus on vehicle durability, in particular, the ability of automobile bumpers to withstand predictable impacts. On March 10 we will focus on occupant protection, including passive restraints, nonlacerating windshields, side impact protection, and improved design for work vehicles.

In these two hearings we will take a look at what consumers could be offered in safety technology. On March 11 a final day of hearings will explore with the Department of Transportation, the major automobile manufacturers, and leading insurance compa-

nies, ways in which we might get safety improvements more quickly out of the research laboratories and into the marketplace where they can do some good.

The importance of motor vehicle safety cannot be overemphasized. Vehicle-related accidents are the chief killer of American youth, the foremost cause of death among members of the Armed Forces, and the leading cause of fatal injuries in the workplace, far surpassing occupational hazards such as falls, mine collapses, and machinery malfunctions. They occur at a rate of about one every 3 seconds. They result in approximately 50,000 deaths and 4 million injuries each year. And they cost an estimated \$50 billion annually.

It is my hope that these hearings will provide a forum for creative thought and lead to some productive new initiatives. I look forward with great interest to the testimony that will be presented.

Senator Hollings has requested that his opening statement be included at this point in the record.

[The statement follows:]

OPENING STATEMENT BY SENATOR HOLLINGS

I want to commend Senator Danforth for scheduling these hearings on automobile safety. I was heartened by Transportation Secretary Dole's clear intent to make transportation safety a high priority at the Department. We must all work to ensure that the Federal Government remains a leader in transportation safety.

Through these hearings, I hope that we will continue to come up with ideas to improve automobile safety. Because of my deep concern for safety, I have been a strong supporter of Federal drunk driving legislation. I co-sponsored Senator Danforth's drunk driving bill in the 97th Congress. I was pleased that it passed both Houses of Congress and was signed by the President. Car accidents involving alcohol account for 25,000 deaths on the highway each year and this law represents the first significant Federal effort to stop this tragic loss of life. I am encouraged by the Department's quick action in implementing this legislation. Increased efforts to combat drunk driving at the Federal, State and local levels will hopefully save many lives on our Nation's roads.

I look forward to exploring new and developing technologies in this area in the 98th Congress.

Senator DANFORTH. Our first witness is Mr. Brian O'Neill, senior vice president of the Insurance Institute for Highway Safety.

STATEMENT OF BRIAN O'NEILL, SENIOR VICE PRESIDENT, INSURANCE INSTITUTE FOR HIGHWAY SAFETY, ACCOMPANIED BY BEN KELLEY, SENIOR VICE PRESIDENT

Mr. O'NEILL. Senator, I have with me today Mr. Kelley, who is also a senior vice president of the institute.

Mr. Kelley and I are appearing today in response to the subcommittee's request for information relating to the substantial impact of recent automobile bumper design changes that have occurred as a direct result of the weakening of Federal bumper standard requirements.

That weakening occurred in 1982, when the National Highway Traffic Safety Administration reduced the Federal bumper standards barrier impact requirements from 5 to 2.5 miles per hour. The National Highway Traffic Safety Administration claimed at that time that 2.5-mile-an-hour bumpers would cost and weigh less than 5-mile-an-hour bumpers, enough less, the agency asserted, to offset the increased repair costs, increased insurance costs, and increased

delays and inconvenience associated with the extra crash damage due to the weaker bumpers.

As the institute pointed out in a petition to NHTSA to reconsider its decision to allow weaker bumpers, the analysis that NHTSA used to support its decision to go with weaker bumper systems was based upon assumptions unsupported by real data. Interestingly, in its denial of our petition, NHTSA argued that, "The data on possible net benefits for higher speed standard"—in this case they were talking about a 7.5-mile-per-hour bumper standards—"was very limited and conjectural and not even marginally reliable for decision making."

Yet the data used by NHTSA to support the weaker 2.5-mile-per-hour standard were equally limited and conjectural.

Now that the Federal standard has been weakened to permit 2.5-mile-per-hour bumpers, it eventually will be possible to replace much of the guesswork in the National Highway Traffic Safety Administration's analysis with data derived from the performance of 2.5-mile-per-hour bumpers in the real world.

In fact, the initial consequences of the bumper standard rollback are beginning to show up in the new-car marketplace as several car manufacturers have already significantly weakened the bumpers on a number of their 1983 models. These weaker bumpers already refute some of the agency's conjectures.

At the present time all of the 1983 Hondas and Volvos being sold in the United States have bumpers that are inferior to those on corresponding 1982 models. These new bumpers have been characterized by their manufacturers as having 2.5-mile-per-hour performance.

In addition, 1983-model Plymouth Horizons and Dodge Omnis manufactured after October 1982 also have inferior 2.5-mile-an-hour bumpers. And corresponding 1983 models made earlier have 5-mile-an-hour bumpers. Chrysler has also weakened the front bumpers of the 1983 Plymouth Reliants and Dodge Aires as well as some other models during the middle of the 1983 model-year.

During the 1970's and into the early 1980's automobile bumper designs were improving in reflection of advances in technology prompted by Federal bumper standard requirements. Bumpers built in response to the first Federal safety bumper standard were crude compared to the more recent ones. Although even these first bumpers built under the Federal standards reduced crash damage costs, in later years bumpers have become not only more effective in reducing crash damage but also lighter.

These improvements involve both bumper energy absorbers which have been an integral part of most 5-mile-an-hour bumper systems as well as face bars. In the early 1970's bumper face bars typically were made of heavy chrome-plated steel. In later years they increasingly have been made of lightweight materials such as high-strength steels and aluminum.

The technology used by Chrysler, Honda, and Volvo for their new 2.5-mile-per-hour bumpers reverses this trend toward more effective lighter bumper systems. Instead of attaching the bumper face bar to the car with energy absorbers designed to manage low-speed crash energy without damage, the new Chrysler and Honda bumpers attach the face bar to the car with rigid brackets, which

absorb crash energy by deforming; in other words, by sustaining damage themselves.

Among the cars with new 2.5-mile-an-hour bumpers only the 1983 Volvo continues to use energy absorbers, in this case, much shorter and less efficient but, interestingly, equally as expensive as those used on the 1982 Volvos with 5-mile-an-hour bumpers.

It is impossible to determine whether the sticker prices of Hondas and Volvos with 2.5-mile-an-hour bumpers have been reduced as the National Highway Traffic Safety Administration indicated they would be, since the bumper design changes on these cars coincided with the new model-year.

However, Chrysler changed the bumpers on some of its cars in the middle of the 1983 model-year, so it is possible to compare its new-car prices for otherwise identical cars with 5- and 2.5-mile-per-hour bumpers. The list base prices for Chrysler models with the weaker bumpers are identical to those with corresponding models with the earlier 5-mile-an-hour bumpers.

There have been some weight reductions for these new bumpers. The entire front and rear 2.5-mile-an-hour bumper systems on Hondas, Chryslers, and Volvos weigh less than the corresponding 5-mile-an-hour bumpers. The 1983 Honda Civic's 2.5-mile-an-hour bumper system weighs approximately 13 pounds less than the 5-mile-an-hour system on the earlier Civic models. The Accord's 2.5-mile-an-hour bumper system weighs 18 pounds less.

The Plymouth Horizon and Dodge Omni's 2.5-mile-an-hour bumper systems weigh only 2 pounds less than the 5-mile-an-hour bumper systems on previous models. The Plymouth Reliant and Dodge Aires' 2.5-mile-an-hour front bumper systems weigh 6 pounds less. And on the Volvo, which has always had heavy bumper systems, the 2.5-mile-an-hour bumper system weighs 35 pounds less than the earlier 5-mile-an-hour bumper system.

The Environmental Protection Agency's mileage ratings for the cars with the inferior bumpers are exactly the same as for corresponding models with 5-mile-an-hour bumpers, all other things being equal. This is not surprising, since according to NHTSA's analysis the reduced weight of these new models with 2.5-mile-an-hour bumpers translates into as little as 2 gallons and never more than 35 gallons of gasoline saved per car over a 10-year lifetime.

In other words, the owner of a Plymouth Horizon with 2.5-mile-an-hour bumpers could on the average expect to use only two-tenths of 1 gallon of gasoline per year less—per year—than the owner of an otherwise comparable Plymouth Horizon with 5-mile-an-hour bumpers.

The Institute has recently completed a series on the low-speed crash tests comparing the performance of these cars with new 2.5-mile-an-hour bumpers and otherwise comparable cars with 5-mile-an-hour bumpers. Mr. Kelley is going to introduce a film that incorporates the results of these tests.

Mr. KELLEY. Since the film will be visible from this side of the room, due to the logistics, I might suggest that the members of the committee and staff who want to see it join us down here. Seats have been set aside for that purpose. And while you are doing that, let me give you a brief description of what you are about to see.

The Insurance Institute for Highway Safety has been looking at the actual performance of bumper systems in crash tests of various kinds for more than a decade. And so we have a unique and impressive record over the years of how bumpers actually are doing when they hit things in so-called minor impacts, described sometimes appropriately as "fender-benders" because they have with poor bumper designs unnecessarily bent fenders of cars that should not be damaged.

We have pulled that material together in the documentary film that you are about to see, which we are releasing today. And at the conclusion of the film, I would suggest that committee members stop by the table here on your way up, because we will then be looking in more detail at the bumper technologies that are arrayed here before us.

You will see those summarized in the film, and we will be happy then to talk about them at the conclusion of the film.

[Film shown]

Mr. KELLEY. Webster's Dictionary defines a car bumper as a device or attachment for absorbing shock and lessening or preventing damage in an impact or collision with another object. But it was not so long ago that new-car bumpers had very little to do with that definition. Until about a decade ago the history of bumpers was a history of high-cost, designed-in damage in low-speed impacts.

Consider the 1971 models, for instance. Their bumpers were typical of the times. Bumpers nestled into the sheet metal of the car body where they would not only not prevent damage in so-called minor impacts but could make the damage even worse—sharp, pointed-weapon-like bumpers that would needlessly maim whatever they hit whether a person or another car. Bumpers with heights that varied widely from one to another so that in front-to-rear impacts this would happen.

Bumpers back then wasted huge amounts of wasted time and money for damage in parking lots or similar bumps at just a few miles an hour. And they meant needless hazard for car owners and occupants because the parts damaged in those impacts, parts the bumpers should have protected, often involved safety. Cracked windshields, ruptured radiators, broken fuel lines, jammed doors, broken lights and turn signals—these were all too common in minor, sometimes unavoidable, collisions.

The situation was so bad that it had become a public issue, and even a public joke. By 1971 congressional hearings were being held into the bumper problem. Meanwhile, the U.S. Transportation Department was considering a standard to require that new-car bumpers be able to protect at least safety-related parts in minor collisions.

As the issue came into public focus, three basic facts emerged. First, car bumper designs were permitting extensive, costly damage in various crashes at speeds as low as 2.5 miles an hour; 2.5 miles an hour, by the way, is the speed at which a toddler walks.

Second, no Government or industry standards were in place to bring about improved bumper designs.

Third, energy-absorbing technologies were available for bumper designs to eliminate all damage in crashes at 5 miles an hour and higher, but they were not showing up on cars.

By mid-1972 the Transportation Department had adopted the standard requiring that future new car bumpers protect safety-related parts—windshields, lights, and the like—against damage in 5-mile-an-hour barrier impacts tests. This was the so-called bumper safety standard, and Congress had passed a law directing the Department to do even better by eventually adopting a standard to eliminate essentially all damage in low-speed impacts, a so-called no-damage bumper standard.

Just how badly the bumper standards were needed had been shown a year earlier by Insurance Institute for Highway Safety bumper impact tests of typical new small cars: The 1971 Toyota Corolla, the 1971 Volkswagen Super Beetle, and the 1972 Chevrolet Vega.

Getting rid of poor bumpers was the aim of the new standards, and they did that job with increasing effectiveness. This is a 1972 Ford Pinto made before the bumper safety standard took effect. Damage its bumper permitted in a 5-mile-an-hour frontal barrier impact, \$346. In a rear impact, \$543.

In contrast, here is the 1974 Pinto, the first model to meet the 5-mile-an-hour bumper safety standard. In the front barrier test, no damage at all. In the rear test, only \$25.

Because of the 5-mile-an-hour bumper safety standard, Ford Pintos and, increasingly, other cars as well, were able by the mid-1970's to withstand these flat barrier impacts with no damage at all, but in more demanding kinds of low-speed impacts, improvement still was needed.

Take the angle impact. Unlike the flat barrier test which spreads the force this way evenly across the face of the bumper, the angle impact concentrates the force here at the bumper's corner. It is like bumping into a parking lot wall during a blind turn. Even with a somewhat improved bumper, the 1978 Pinto sustained heavy damage at 5 miles an hour front into barrier at an angle, damage that could have been avoided by better bumper designs. Few other 1978 cars fared much better in these tests.

Throughout the 1970's, bumper systems had been growing increasingly lighter, in part because the energy absorbers on which the bumper is mounted were growing smaller, lighter, and more efficient. This is the 1974 Pinto bumper mount, 10.5 pounds. The 1978 Pinto bumper mount, 7.4 pounds. The 1981 Ford Escort bumper mount, only 4.3 pounds.

How much of a difference were better bumpers making in reducing damage in real-world crashes? Two sets of data were providing striking answers to that question by the late 1970's.

First, a major insurance company, State Farm Mutual, analyzed its claims records to determine the effect of the better bumpers on the damage experience of its policyholders' cars. The analysis covered 1970-model cars when no bumper standards were in effect through 1977 models by when the bumper safety standard had been in effect for some years.

It specifically looked at the percentages of reported front and rear center impacts that required replacement of the bumper face

bar. The conclusion: Damage had declined dramatically as a result of the more protective bumpers. The minor collisions still were taking place in parking lots, driveways, and along the road, but because of the better bumpers, more and more often they were resulting in little or no damage.

Car owners with deductible collision insurance coverage must pay the first dollars of repair costs out of their own pockets. So for them, such data were particularly heartening.

In a separate analysis, the Highway Loss Data Institute, an affiliate of the Insurance Institute for Highway Safety, was looking at the overall collision claims experience of cars by size group both before and after the bumper safety standard took effect. The analysis focused on average loss payments per insured vehicle-year, which in effect described the average loss per car per year. It covered from 1972 car models, the year before the bumper safety standard took effect, through 1976 models when it had been effect for 4 years.

Like the State Farm analysis, this one showed clear evidence that insurance collision coverage claims experience was improving because of less damage in low-speed crashes.

By the 1981 model-year, two important changes had occurred. First, the Transportation Department's 5-mile-an-hour no-damage bumper standard had taken effect. Second, Ford Motor Co., and other manufacturers had further improved the designs of their bumper energy absorbers, making them lighter and more efficient than ever. Thus, Ford's 1981 Escort, the company's new entry into the small-car market, was able in the front-angle test to put the earlier Pinto bumpers to shame.

Under the new no-damage bumper standard, other cars also were doing well in 5-mile-an-hour front-angle impact tests. Will the improvement continue? If technology dictates the answer, it should. Soft-face bumpers, like this one, have been shown to prevent damage at speeds above 5 miles an hour. They are lightweight and, in a car-to-pedestrian collision, they are kinder than metal bumpers. Efficient, lightweight energy absorbers, like this one developed by a major manufacturer of missile shock mounts, also can lead to better bumper systems. This energy absorber is 2 pounds lighter even than the Ford Escort version.

Another example of better technology: Volkswagen equipped its 1980 Rabbit with a steel bumper, and in a 5-mile-an-hour front-angle impact, this happened. The 1981 Rabbit had a lighter and less expensive aluminum bumper, and only \$25 in damage in the same test.

But ironically, even as the technology continues to improve, a major impetus for getting it onto new cars has been dropped. Since mid-1982 Government standards have no longer required a 5-mile-an-hour no-damage capability in barrier impact tests. Instead, they permit damage at speeds as low as 2.5 miles an hour, virtually the speeds for which bumpers were designed back in the early 1970's before any bumper standard took effect.

What this means for new-car buyers was pointed up in a very recent series of tests by the Insurance Institute for Highway Safety. Two groups of basically identical cars were tested, one group with 5-mile-an-hour bumpers, the other with 2.5-mile-an-hour

bumpers. On the top, the 1982 Honda Accord with the 5-mile-an-hour bumper. On the bottom, a 1983 Accord with a 2.5-mile-an-hour bumper.

In these 5-mile-an-hour tests the difference was obvious. Even in 10-mile-an-hour front barrier impacts, the 5-mile-an-hour bumper allowed nearly \$1,000 less in damage than the 2.5-mile-an-hour bumper. This 1983 Plymouth Horizon has 5-mile-an-hour bumpers. This one, 2.5-mile-an-hour bumpers. Like the Accord, the Horizon with the better bumpers produced little or no damage in the series of 5-mile-an-hour tests, compared with huge amounts for the Horizon with the 2.5-mile-an-hour bumpers, again like the Accord, the difference in damage in a 10-mile-an-hour test was dramatic, with the 5-mile-an-hour bumper allowing \$400 less damage than the 2.5-mile-an-hour bumper.

The institute even tested the Horizons at 15 miles per hour, a crash speed at which it has been claimed that a 5-mile-an-hour bumper does no good at all. Here it did more than 500 dollars' worth of good. Two Accords, the one on the right with the 5-mile-an-hour bumper, the one on the left with a 2.5-mile-an-hour bumper. The 5-mile-an-hour bumper is mounted on energy absorbers, like this one. The 2.5-mile-an-hour bumper is mounted on rigid brackets like this one. An invisible difference, but it could mean hundreds of dollars in repair costs after even a so-called minor impact.

Not all manufacturers have put 2.5-mile-an-hour bumpers on their latest models. As of early 1983, Ford, Nissan, Saab, and Mercedes-Benz were among those manufacturers who still were equipping their cars with 5-mile-an-hour bumpers. But Volvo, Chrysler, Honda, and Volkswagen had chosen to weaken the bumpers on many of their new cars to 2.5 miles an hour.

I hate to see us go back to where we were 10 years ago when the bumpers did not protect—I think there ought to be certain minimum safety standards on cars—I am upset about the fact that the safety standards for bumpers have been reduced—If we have got the technology to do it, and obviously we have, now is not the time to be rolling it back. Put a bumper on, it is worthwhile—Keep making it worthwhile—I would not be interested in buying a car that did not have the better bumper, and if I really have any reasonable choice within the range of acceptable cars, I will buy a car that is likely to have a lower repair cost in the event of an accident.

That is typical of how carowners feel about the bumper issue. In a 1982 national survey Opinion Research Corp. found that a vast majority of carowners want better bumpers and are willing to pay for them. Will the bumper standards be raised back to 5 mile per hour? Will car companies decide to compete by marketing better bumpers, or is the good bumper simply becoming a thing of the past?

The answers to those questions have yet to emerge. But in the meantime, one thing is certain: The weaker 2.5-mile-an-hour bumpers will bring with them a wave of damage in low-speed impacts, and in its wake millions of hours of wasted time and millions of dollars in needless repair costs for America's carowners.

That concludes the film. And we would be happy to show the members the components that were described in the film briefly in more detail. We are going to discuss those components now as Mr. O'Neill continues his testimony.

Mr. O'NEILL. These are examples from the film, Senator. This, for example, is the 1974 Pinto energy absorber, the first one used by Ford. This is an example of the improvement in the technology which is the latest Ford energy absorber on the Escort. Not only is it lighter, it is much more effective. It does a much better job than this earlier version.

Mr. KELLEY. I showed this shock absorber mount in the film. This is made by a company headed by a gentleman who is going to be a witness later in the hearing today, and may have something even newer. But as of a few years ago, he was manufacturing this and offering it to car companies at a very reasonable price. And it is about half as light as the best thing Ford now has on its bumpers, and even more shock-resistant.

Over here are the contrasting Honda Accord 5-mile-an-hour and 2.5-mile-an-hour bumper mounts. That is the one from the 1982, and this is the replacement for 1983. And this 2.5 mph version, as you see, is going to be damaged in a crash. It is made to be damaged in a crash, and thus to have to be replaced along with whatever else is hurt. The 5 mph version absorbs damage and returns to its original position and continues to do its job.

This is the pair from the Horizon. That is from the early 1983 Horizon, and is an energy absorber. This is on the newest versions of the Horizon, and is just a rigid bracket. And this is a lightweight soft-faced bumper, typical of the type.

This one is on the Renault Alliance, and as you can see, it is forgiving if it hits something, and again restores itself. And as again I mentioned in the film, from a pedestrian standpoint as well as a property standpoint, you are much happier being hit with this than the other.

And these, in conclusion, are the two Volkswagen bumpers, the steel bumper which was from the earlier model which had so much damage in the film, and the lighter aluminum bumper which did much, much better in the test.

We do not have room to drive the cars themselves in here, but you saw them on the film.

Senator DANFORTH. Thank you.

Mr. O'NEILL. The film showed examples of the poor crash test performance of some of these cars with the new, inferior 2.5-mile-an-hour bumpers compared to the 5-mile-an-hour bumpers used earlier on the same cars. We have here three slides that summarize the crash damage repair cost for all of the cars in the 5- and 10-mile an hour crash tests that we conducted in this recent series.

[Slide.]

Mr. KELLEY. These are also shown as tables in the printed testimony, for those of you who have that in your hand.

[The tables follow:]

TABLE 1.—1982-83 MODELS—FRONT-END CRASH TESTS DAMAGE REPAIR COSTS ¹

Make, model, and year	Bumper system (mph)	5 mph barrier	5 mph angle barrier	10 mph barrier
Honda Accord LX:				
1982.....	5	0	\$459	\$578
1983.....	2.5	\$299	880	1,402

TABLE 1.—1982-83 MODELS—FRONT-END CRASH TESTS DAMAGE REPAIR COSTS ¹—Continued

Make, model, and year	Bumper system (mph)	5 mph barrier	5 mph angle barrier	10 mph barrier
Honda Civic 1500 DX:				
1982.....	5	0	377	532
1983.....	2.5	188	455	592
Plymouth Horizon:				
1983.....	5	0	29	418
1983.....	2.5	66	223	846
Plymouth Reliant:				
1983.....	5	0	267	809
1983.....	2.5	171	181	689
Volvo GL:				
1982.....	5	0	143	613
1983.....	2.5	138	745	838

¹ Repair costs are based on January 1983 parts prices and a labor rate of \$17 per hour. Criteria for bumper facebar damage were adapted from the DOT Part 581 Bumper Standard requirements in effect between Sept. 1, 1979 and July 6, 1982.

Note.—1983 Plymouth Reliants have "2.5 mph" bumpers only on the front end; 5 mph bumpers were retained in the rear. Consequently, rear-end crash tests were not performed.

TABLE 2.—1982-83 MODELS REAR-END CRASH TESTS DAMAGE REPAIR COSTS ¹

Make, model, and year	Bumper system (mph)	5 mph barrier	5 mph pole
Honda Accord LX:			
1982.....	5	0	\$158
1983.....	2.5	\$198	736
Honda Civic 1500 DX:			
1982.....	5	0	174
1983.....	2.5	157	423
Plymouth Horizon:			
1983.....	5	0	0
1983.....	2.5	181	193
Volvo GL:			
1982.....	5	0	0
1983.....	2.5	128	335

¹ Repair costs are based on January 1983 parts prices and a labor rate of \$17 per hour. Criteria for bumper facebar damage were adapted from the DOT Part 581 Bumper Standard requirements in effect between Sept. 1, 1979 and July 6, 1982.

Note.—1983 Plymouth Reliants have "2.5 mph" bumpers only on the front end; 5 mph bumpers were retained in the rear. Consequently, rear-end crash tests were not performed.

TABLE 3.—1982-83 MODELS—FRONT- AND REAR-END CRASH TESTS, DAMAGE REPAIR COST TOTALS ¹

Make, model, and year	Bumper system (mph)	All front-end tests	All rear-end tests	All tests
Honda Accord LX:				
1982.....	5	\$1,037	\$158	\$1,195
1983.....	2.5	2,581	934	3,515
Honda Civic 1500 DX:				
1982.....	5	909	174	1,083
1983.....	2.5	1,235	580	1,815
Plymouth Horizon:				
1983.....	5	447	0	447
1983.....	2.5	1,135	374	1,509
Plymouth Reliant:				
1983.....	5	1,076		
1983.....	2.5	1,042		

TABLE 3.—1982-83 MODELS—FRONT- AND REAR-END CRASH TESTS, DAMAGE REPAIR COST TOTALS ¹—Continued

Make, model, and year	Bumper system (mph)	All front-end tests	All rear-end tests	All tests
Volvo GL:				
1982.....	5	756	0	756
1983.....	2.5	1,721	463	2,184

¹ Repair costs are based on January 1983 parts prices and a labor rate of \$17 per hour. Criteria for bumper facebar damage were adapted from the DOT Part 581 Bumper Standard requirements in effect between Sept. 1, 1979 and July 6, 1982.

Note.—1983 Plymouth Reliants have "2.5 mph" bumpers only on the front end; 5 mph bumpers were retained in the rear. Consequently, rear-end crash tests were not performed.

Mr. O'NEILL. This first slide shows the results of the front-end crash tests of the five cars that were in our current series of tests; the Accord, the Civic, the Horizon, the Plymouth Reliant, and the Volvo GL. And as you can in virtually all of the tests, the cars with the 5-mile-per-hour system performed considerably worse than the ones with the newer, inferior 2.5-mile-per-hour systems.

I particularly draw your attention to the results for the Honda Accord with 2.5-mile-per-hour bumpers. The Honda Accord was one of the biggest selling cars in the United States last year, and I presume it is a big seller this year. Among the group of cars tested here, the Accord with 2.5-mile-per-hour bumpers had, by far, the worst experience.

Also, the Plymouth Horizon with 5-mile-per-hour bumpers that are no longer being manufactured, had particularly good performance. In fact, the Plymouth Horizon, in previous tests of the institute, has done very well. It's 5-mile-per-hour bumper was a very lightweight system and it was the best of the 5-mile-per-hour systems in this current series of tests. But unfortunately, it is no longer being manufactured.

[Slide.]

Mr. O'NEILL. Similarly, the rear-end tests show very big differences between the cars with 5-mile-per-hour bumpers and the corresponding versions of the cars with the new, inferior 2.5-mile-per-hour systems. The Honda Accord, with 2.5-mile-per-hour bumpers did particularly poorly, and the Plymouth Horizon and Volvo with 5-mile-per-hour bumpers did particularly well in these tests. Again, unfortunately, the Horizon and Volvo 5-mile-per-hour bumpers are no longer being manufactured.

[Slide.]

Mr. O'NEILL. The final slide summarizes the total damage repair amounts in all of the tests for the two groups of cars; those with the 5-mile-per-hour bumpers and those with the new, inferior 2.5-mile-per-hour bumpers. And as you can see, the overall differences are huge, particularly in the case of the Volvo and the Honda Accord. The Honda Accord, with its new 2.5-mile-per-hour bumper system, produced 3,500 dollars' worth of damage in this series of low-speed, very low-speed tests.

In fact, in the 23 pairs of tests summarized in the slides, except for the 5-mile-per-hour front into barrier, and the 10-mile-per-hour front into barrier test of the Plymouth Reliant, the cars with the 2.5-mile-per-hour bumpers sustained substantially more damage than the corresponding models with 5-mile-per-hour bumpers. This

was true in the 10-mile-per-hour tests as well as the 5-mile-per-hour tests.

In addition, both versions of the Plymouth Horizon were crashed into the barrier at 15 miles per hour. Even at this speed, the model with the 5-mile-per-hour bumpers was more than \$500 less expensive to repair than the car with the 2.5-mile-per-hour bumpers. The Institute's 10- and 15-mile-per-hour crash test results for these cars, as well as tests of earlier models at similar speeds, refute the erroneous notion that at speeds above 5 miles per hour, cars with 5-mile-per-hour bumpers become more expensive to repair than cars with weaker, 2.5-mile-per-hour bumpers.

I might note that the National Highway Traffic Safety Administration has claimed that the initial 2.5-mile-per-hour bumpers manufactured under the new standard will retain at least some characteristics of 5-mile-per-hour bumpers. This apparently means that they will be providing at least slightly better protection than subsequent 2.5-mile-per-hour designs.

If so, the already poor performance of the cars with the initial 2.5-mile-per-hour bumpers, the cars seen in these tests, still must be somewhat better than that to be expected of subsequent cars with 2.5-mile-per-hour bumpers that no longer retain the characteristics of 5-mile-per-hour bumpers.

As mentioned earlier, the bumpers on these cars manufactured by Chrysler, Honda, and Volvo are the first examples of performance degradation allowed by the new, weaker Federal bumper standard. Other manufacturers have announced plans to abandon modern bumper technology and to revert to designs that absorb crash energy by bending metal. That is, by sustaining damage rather than by managing energy without damage or deformation.

In a recent submission to the National Highway Traffic Safety Administration, Volkswagen has indicated that it is planning to use rigid brackets instead of energy absorbers on future Rabbits. Other manufacturers have announced plans for varying levels of bumper performance degradation.

Fortunately for car buyers, some manufacturers are promising to continue, for the time being, to sell cars with 5-mile-per-hour bumpers. BMW, Ford, Mazda, Mercedes, Nissan, Saab, Subaru and Toyota have all stated that they will continue offering 5-mile-per-hour bumpers on most of their car lines for at least the remainder of the 1983 model year. None of these, however, appears to be advertising the superiority of its current new car bumpers.

As the film pointed out, there is tremendous public support for bumpers that provide protection in impacts at 5 miles per hour and even higher speeds. Institute-sponsored opinion polls have shown that the public overwhelmingly is in favor of the Federal Government specifying minimum bumper performance levels of at least 5 miles per hour. The public is equally in favor of car manufacturers specifying the speeds at which their bumpers offer protection.

Yet, manufacturers have chosen not to inform the public about bumper performance levels; in particular, manufacturers who have equipped their 1983 models with 2.5-mile-per-hour bumpers have not informed the public that they have substantially weakened their bumpers. These new 2.5-mile-per-hour bumpers will cost the

public considerable additional money, time and bother in increased repairs, delays and inconvenience.

Contrary to the claims made in the National Highway Traffic Safety Administration analysis, these additional costs are not likely to be offset by any substantial benefits. For example, there is no evidence of a single new car price reduction for 2.5-mile-per-hour bumpers. And except for the Volvo, the slight weight reductions associated with the new bumpers produce only trivial, essentially unmeasurable fuel consumption improvements. On the average, two-tenths of a gallon per car per year for the Plymouth Horizon, and 1.8 gallons per car per year for the Honda Accord.

In return for such trivial savings, owners of cars with 2.5-mile-per-hour bumpers involved in low-speed impacts will face considerably higher repair bills than would have occurred if the cars had 5-mile-per-hour bumpers. They eventually will pay higher insurance premiums to reflect the poorer bumper performance, and they will pay directly for much of the extra damage to their cars because for many repairs, they will pay the first \$100 or more in insurance deductibles.

In summary, the initial responses of some car manufacturers to the weakening of the Federal bumper standard failed to support the National Highway Traffic Safety Administration's projections of consumer savings to offset the increased repair cost associated with weaker bumpers. On the contrary, the early evidence strongly suggests that the only noticeable consequence of the weaker bumper standard will be significantly increased consumer costs for repairs as cars sustain greater damage in the low-speed impacts that sooner or later involve virtually all car owners.

Thank you. We will be happy to answer any questions.

Senator DANFORTH. Gentlemen, thank you very much. Most people do not drive 2½ miles an hour, or even 5 miles an hour, so is the difference between the 2½- or 5-mile bumper a theoretical issue? Or does it have practical implications for people who drive in the normal manner?

Mr. O'NEILL. No, sir, it has very important practical implications because although people are not typically traveling at speeds of 2½ or 5 miles an hour, in many urban situations, parking lots, commuting traffic streams, large numbers of crashes do occur in these speed ranges. It is the actual impact speeds that become important rather than the travel speeds.

Senator Danforth. In other words, they are decelerating when they reach impact and they may be traveling 5 miles an hour or 10 miles an hour, and the bumper difference at that speed is what is significant?

Mr. O'NEILL. That is correct. And when we are talking about 5 miles an hour in terms of the bumper standards, we mean 5 miles an hour into a barrier, and that is roughly equivalent to 10 miles an hour in a car-to-car collision. For example, a front to rear barrier collision.

Mr. KELLEY. I think I had a probably typical such experience the other evening, Senator, in the snow and ice in my 1975 Volvo, which is equipped with a fairly sturdy bumper that met the then 5-mph safety standard. And I was just leaving a parking lot of a shopping center and hit a patch of ice and snow and had wha'

probably was no more than a 3½- or 4-mile-an-hour impact—I could not have gotten up over that speed—into a pole and experienced no damage whatsoever to the car. And I am grateful that I do not have an 1981 Volvo because I do not think I would have emerged from that incident without a repair cost.

Senator Danforth. To an average driver, what does this mean? Can the Insurance Institute project the difference in cost to an average driver over the life of a car between the 2½- and a 5-mile standard?

Mr. O'NEILL. It is difficult to do that precisely, Senator. The best evidence we have on the real world experience of bumpers comes from comparisons of cars before there were any bumper standards with cars meeting the initial Federal safety standard and the later Federal property damage standard, both of which were 5-mph standards. And the data on those comparisons show tremendous reductions in insurance costs and damage amounts have occurred in the real world for cars with 5-mph bumpers.

And probably the best data we have on 2.5-mph bumpers is from the 1973 models when the safety bumper standard for the rear ends of the cars was set at only 2.5 mph. The big improvement between cars with 5-mph bumpers and those with prestandard bumpers did not show up on the rear ends of the 1973 models, which only had 2.5-mph bumpers.

We are not quite sure at what levels bumpers protected cars before there were any bumper standards. The National Highway Traffic Safety Administration has indicated that prior to Federal bumper standards, bumpers only protected at 1½ miles an hour. There are other claims that they were already—

Senator Danforth. Is there any way that you can predict the difference as far as the car owner is concerned between having a 2½- and a 5-mile bumper? For example, would the insurance premiums be different?

Mr. O'NEILL. The insurance industry has estimated that collision coverage insurance premiums would increase by as much as 15 to 20 percent. That would be one out-of-pocket expense for the owner. But for the owners involved in low-speed collisions, there would be an even more direct out-of-pocket expense because of the fact that they are paying the insurance deductible. In other words, the first \$100 or more of the repair bills.

Senator DANFORTH. And you say fuel efficiency is not a real argument because it is such an insignificant amount of fuel saved.

Mr. O'NEILL. It is virtually unmeasurable.

Senator DANFORTH. What would be the reasons for the 2½-mile standard? Is it cheaper for the car company?

Mr. O'NEILL. The National Highway Traffic Safety Administration justified its decision on the grounds that cars with 2½-mile-an-hour bumpers would cost less, they would weigh less and that these initial cost savings and weight savings would translate into greater savings than the increased repair costs that the agency agreed would occur as the result of the weaker bumpers.

As we have seen so far, there are no price reductions. The weight reductions are nothing like as large as anticipated.

Senator Danforth: What do you think the standard should be?

Mr. O'NEILL. I think it should be at least 5 miles an hour, and I think it should be at 5 miles an hour encompassing a wider range of crash tests than the previous standard, angle-barrier tests, rear-pole tests. Cars are in the marketplace right now that can meet a wide range of 5-mile-an-hour tests that go beyond the previous Federal 5-mile-an-hour requirements with no damage whatsoever. In particular, the Ford Escort. We have run that car through a series of 5-mile-an-hour tests that go beyond the Federal requirements and it sustains no damage at all in those tests.

Senator DANFORTH. Senator Exon?

Senator. EXON. Thank you, Mr. Chairman. Mr. O'Neill, let me see if I can narrow this down. We are not talking about vehicle safety here; we are really talking about durability, aren't we? I mean, there is not a safety factor involved, is there?

Mr. O'NEILL. There is a safety issue involved, Senator. The initial Federal bumper standard, the initial 5-mile-an-hour standard which took effect for the 1974 model year was a safety standard. It was a standard requiring that cars be designed so that damage to safety related equipment not occur in low-speed impacts: turn signals, lights, braking systems, et cetera.

There is an issue of safety; it is a very hard issue to quantify but it is the issue of cars operating with broken turn signals, broken lights, as a result of minor collisions.

Mr. EXON. Well, I think I understand what you are trying to say, but wouldn't you agree with me that we are talking about durability as a major consideration as opposed to safety? Is that a fair statement?

Mr. O'NEILL. Yes, sir.

Senator. EXON. OK. Now I am sorry, I apologize for being a little late and I did not see your earlier percentage. What percentage of the car overall, without getting into specific models, but what percentage of the cars sold in America today have 5-mile-per-hour or higher bumpers, and what percentage have less than 5?

Mr. O'NEILL. At the present time, we have identified the 1983 Hondas—

Senator EXON. No, I am talking about the percentage now. I mean, do half of them have 5 miles per hour or more and half of them less, or what?

Mr. O'NEILL. No, I would say that the great percentage of cars on the road today have 5-mile-an-hour bumpers because there has been a Federal requirement for 5-mile-an-hour bumpers since the 1974 model year. So any car between 1974—

Senator EXON. Well, I understand that. So that we do not waste a lot of time, in 1983, what percent of the new cars sold had 5 miles per hour or more or less?

Mr. O'NEILL. Senator, I am not sure of the sales figures for the cars with the weaker bumpers, but the Honda Accord, for example, has a 2.5-mile-an-hour bumper system in 1983, and last year it was one of the two or three biggest selling cars in the United States. But the majority of the cars in the 1983 model year still have 5-mile-an-hour bumpers.

Senator EXON. What you are saying then is that unless we make a change there is going to be more and more that come to it. Is that your point?

Mr. O'NEILL. The announced plans of the manufacturers are indicating that there will be more and more cars manufactured and sold with 2.5-mile-an-hour bumpers.

Senator EXON. Well, let me phrase this question to you, then. While I have great sympathy for what you are saying and I think we have some obligation to try and protect the people as best we can, there have been many cases where we have tried to do too much of that in Government.

Is there a difference in the premium charged by insurance companies dependent upon what kind of a bumper I have on my car, or is it the same?

Mr. O'NEILL. We are not in the insurance business per se, although it is my understanding that most of the insurance companies in the United States now charge collision coverage insurance premiums that reflect the sorts of damage that the cars sustain in crashes, but those premiums are based on the actual highway experience of the cars.

So as the experience for the cars with the weaker bumpers accumulates in the insurance rating organizations and other insurance groups, then I believe that, in turn, those increased costs that we believe will occur—increased repair costs—will translate into increased insurance premiums for those cars.

Senator EXON. That sounds reasonable. Following up on that, then, is there a reasonable possibility that maybe if the Government stays out of this anymore than it is in it already, that we could anticipate that the marketplace and the free enterprise system would take care of it? If I were an automobile salesman selling you a car that had a 5-mile-per-hour rating on it, I would say now here is another feature of our automobile. And also, your insurance costs will be less because of this.

Is there not a chance that the marketplace will take care of this? Or do you think changing the regulation once again is the only way we can do it?

Mr. O'NEILL. There is always a chance that the marketplace will take care of it, but unfortunately, from what we can gather at the present time, car manufacturers and car salesmen are not emphasizing bumper performance at all in their new car marketing. In particular, for example, manufacturers with bumpers that perform considerably better than the minimum Federal requirements when they were at 5 miles an hour have not taken the opportunity to promote the superior bumper systems of their cars.

Senator EXON. Maybe that is one of the reasons we are not selling as many automobiles as we should. I have been a salesman all my life and I never sold automobiles, but if I had a product that had something on it that was to the benefit of my potential customer, he would know about it before he left the showroom.

Mr. KELLEY. Let me, if I may, relate a little experience that I think bears on this. A few years ago, now almost 3 years ago, we tested among others two cars which were almost identical in their competitive roles in the marketplace; one was the then new Ford Escort, Ford's big push into the small car market, and the other was the Toyota Tercel. Those are head-to-head competitors in the marketplace.

We did a series of low-speed crash tests such as you have seen here today, and the Ford Escort vastly outperformed the Toyota Tercel—it registered thousands of dollars less in damage difference because its bumpers were so much better, they were lighter weight, they cost less to replace, just a superior product. And that film appeared on the nightly news and got a tremendous amount of publicity when we released that material.

I had a call the following day from a man who identified himself as a senior account executive with the Ford Motor Co.'s advertising agency. I have forgotten the name of the agency. I would be happy to find out. And he said he had seen this material on television and he wanted to know if we could, in any way, arrange for Ford to have permission to use that material in an advertising campaign to promote the superiority of their product. And he asked how much would it cost, what would be our limitations.

And I said, we will give it to you. We will give you the whole film without charge. We want to see you go out and compete on this. We think that is a marvelous idea. He said, I will call you back as soon as I get in touch with my client. He was very, very excited about the potential for this, but we have never to this day heard back from those people again.

Senator EXON. He probably got fired.

Mr. KELLEY. Well, I hope not. We have repeatedly stressed the availability of our crash test results and our other data to those with a superior product. One organization, one auto manufacturer in this country has taken some advantage of that. General Motors has used data from the Highway Loss Data Institute, our affiliate, in full-page ads to show that their cars are doing somewhat better in claims performance than other cars, but that unfortunately is the exception. So we cannot be encouraging about the potential for the marketplace to pick up this issue and sell cars with better bumpers.

Senator DANFORTH. I might say, Senator Exon, that I have asked that same question because a year or so ago, a report came out which examined safety features in automobiles and reported that American-made cars are substantially safer than Japanese-made cars. I have asked auto executives, "Why don't you advertise that, why don't you really make a major issue out of the safety of automobiles?" The answer is very quick. They say, well, safety doesn't sell cars.

So they really dismiss it. As a matter of fact, I have asked representatives of the auto makers in hearings about the safety differential between United States and Japanese cars and they tend to almost argue against U.S. cars. It is a perverse situation. If they were acting rationally, I agree with you, the marketplace should take over. But this is a case, I really think, of irrationality on the part of the U.S. auto manufacturers.

Mr. KELLEY. Well, we stand ready to make available to any manufacturer who wants it the films that you have seen today in order to promote their better product to the American public, and without a cent of charge.

Senator DANFORTH. But I bet they will not take you up on it.

Mr. KELLEY. I am sorry that I cannot bet on the other side of that, Senator.

Senator EXON. Well, if they will not take us up on it, then some of them should not come to the Federal Government to help bail them out of their financial difficulties. Thank you, Mr. Chairman.

Senator DANFORTH. Thank you, Senator Exon. Gentlemen, thank you very much.

Mr. KELLEY. Thank you, Senator.

Mr. O'NEILL. Thank you, Mr. Chairman.

Senator DANFORTH. Do you want to leave your bumpers?

Mr. KELLEY. Not forever, but for the remainder of the hearing.

[The following information was subsequently received for the record:]

QUESTIONS OF THE MINORITY AND THE ANSWERS THERETO

Question 1. In your statement you say that "the data used by NHTSA to support weaker, 2.5 mph standards were equally 'limited and conjectural' ". Without getting into each piece of data, what do you mean by that?

Answer. In 1979 NHTSA estimated the costs and benefits associated with both decreasing and increasing the performance levels of the 5 mph bumper standard to 2.5 mph and 7.5 mph. In that analysis many of the key parameters concerning the different performance levels were not derived from real world data. Instead they were based on conjecture, and this was equally true for the 2.5 mph performance level as it was for 7.5 mph. Even though its latest analysis used many of the same values for these key parameters, NHTSA rejected consideration of the 7.5 mph performance level because the data were "very limited and conjectural"¹ without ever explaining why the parallel data for 2.5 mph performance were not.

Question 2. Do you believe that producing 5 mph bumpers and producing 2.5 mph bumpers costs manufacturers the same amount? If yes, why? If not, what are your figures on costs of bumper production?

Answer. In general, weaker bumpers should cost slightly less to produce than stronger bumpers. Testimony from several car manufacturers at the October and November 1981 NHTSA hearings on the proposal to weaken the bumper standard indicated that 2.5 mph bumpers would save the consumer between \$30 and \$40 on new car prices because the manufacturers would pass on cost reductions to their consumers. As we pointed out in our February 17 testimony, however, there is no evidence to date to indicate that any manufacturing savings have been passed on to the consumer.

Question 3. What would be the most effective way to inform the public about a car's bumper system protection?

Answer. One way (not necessarily the most effective) would be for the companies to make available to their potential new car purchasers the costs to repair damage resulting from a series of specified low-speed crash tests. To be meaningful, these tests should go beyond flat barrier tests and incorporate other tests such as the angle-barrier and pole-impacts reported by the Institute at the February hearing.

Question 4. Please provide the Committee with your best estimate of the costs and the benefits of reducing the bumper standard from 5 mph to 2.5 mph.

Answer. The Institute has not conducted a formal cost-benefit analysis comparing 5 and 2.5 mph bumpers. The reasons we are opposed to the weaker 2.5 mph standard are straightforward. There is convincing evidence from many sources—crash tests, insurance claims data, surveys of unrepaired damage—that the federal 5 mph bumper standards have substantially reduced consumer costs.

The evidence NHTSA used to estimate the price and weight savings for 2.5 mph bumpers that supposedly will offset the increased repair costs generated in crashes of cars equipped with such bumpers is based on unsubstantiated guesses. In addition, according to NHTSA the principal benefits to consumers from 2.5 mph bumpers should result from their weighing less than 5 mph bumpers. The NHTSA analyses however, ignore the fact that the most recent 5 mph bumper designs (and the designs anticipated for future models) already were becoming extremely light and consequently most of the weight savings projected by NHTSA simply cannot occur. By weakening the federal no-damage bumper standard NHTSA is allowing the well documented benefits associated with 5 mph bumpers to be thrown away, in return for a hope that its guesswork is correct. As we pointed out in our February 17 testimony before your committee, the inaccuracy of some of those guesses already has been exposed.

¹ NHTSA Denial of Petitions for reconsideration. 47 Fed. Reg. 56640 (1982).

Senator DANFORTH. We have next Clarence Ditlow, executive director, Center for Auto Safety.

**STATEMENT OF CLARENCE M. DITLOW III, EXECUTIVE
DIRECTOR, CENTER FOR AUTO SAFETY**

Mr. DITLOW. Thank you, Senator Danforth. I would ask that my full statement be put in the record as I have an abbreviated version.

As was pointed out earlier, from the fall of 1978 through the fall of 1982, American consumers had the benefit of 5-mile-an-hour bumpers on their automobiles. These bumpers protected against 5-mile-an-hour crashes into barriers, which is the equivalent of 10-mile-an-hour crash into a similar parked car. It was overwhelmingly popular with the public. Fully 92 percent of the American public supported it. According to opinion polls, 68 percent said they would pay \$100 for the bumpers.

Yet, as we see from the cost estimates that the auto manufacturers gave to the Department of Transportation in the recent rule-making that rolled it back, the price difference between 2.5-mile-an-hour bumpers and 5-mile-an-hour bumpers in terms of price reductions was only \$30 to \$40. Based on those claims of price savings and additional claims of improved fuel economy, the Reagan administration did in fact roll back the bumper standard to 2.5 miles an hour.

Because of the laws of physics, that is not a simple reduction by a factor of 2, it is a reduction by a factor of 4 from the level of protection that the previous bumpers provided.

The Center for Auto Safety, seeing that the bumper standard was going to be rolled back and expecting that we would see some of the types of performance that have been demonstrated today, that is, that many models would in fact have the weaker bumpers, decided to go out and survey the auto companies, the auto dealers, to find out which models had which bumpers.

In fact, what we found out, as is shown in my statement, is that by this spring, approximately half of all models that will be sold in America will have weaker bumpers.

What we have done in the chart that is in our statement is divide the manufacturers up into "good," "poor," and "inadequate." A good rating is a manufacturer who said it would retain the 5-mile-an-hour bumper for the entire model-year for its automobiles. And as you can see, there are eight companies—Ford, BMW, Mazda, Mercedes, Nissan, Saab, Subaru, and Toyota—who have indicated that they will keep the bumpers on all models. General Motors, Chrysler, and Volkswagen will keep it on some of the models, as indicated.

Only two auto companies indicated that they would go ahead and relax the bumper standards for all their models. And surprisingly, those were Honda and Volvo—two companies that traditionally have more socially responsible positions, who have marketed on that viewpoint in the past. Yet they have gone to 2.5-mile-an-hour bumpers across the board.

We have one additional category of bumper performance. That is "inadequate," where the manufacturer indicated that it was going to modify or weaken the bumpers but the level of protection was not clear, that is, that level of protection provided might only be 4 miles an hour. It was not clear that it would be as low as 2.5.

We suspect by the time we get to look at some of these vehicles on the road, that there will be a shifting and some of the other models that are labeled "inadequate" will in fact go down to 2.5.

As we look at the cars, we see some rather interesting changes. For example, Chrysler did just the opposite of what the Federal Government said should be done. It put 2.5-mile-an-hour bumpers on the front of the car where you need the most protection and put 5-mile-an-hour bumpers in the rear. The reason that we have been told for that—and it shows out the safety factor involved—is that Chrysler was not sure that it could pass the 30-mile-an-hour gas tank standard with a 2.5-mile-an-hour bumper on some of their K cars. So they left the 5-mile-an-hour bumper on to give them that margin of safety advantage associated with the better bumpers.

For the future, though, we expect to see the other car companies going on down to 2.5-mile-an-hour bumpers. What we did in the survey is ask them, what do you plan to do for the future? All but Ford indicated to us that they were considering reducing the 5-mile-an-hour bumpers on their 1984 models.

For consumers in the marketplace, this is an especially disadvantageous position in which they are placed. The consumer has no idea just looking at the car which bumpers are on it, whether it is a 5-mile-an-hour bumper or whether it is a 2.5-mile-an-hour bumper.

What we have done in the statement is display some photos of two 1983 Dodge Aries. This is a photo taken on a local dealership of a car that has the 5-mile-an-hour bumper. If you get down on your hands and knees and if you look under the front bumper, connected to the frame of the car would be one of these energy absorbers that the Insurance Institute for Highway Safety displayed here today.

On the other hand, if you look at another car, this one right here, it has virtually the identical bumper. You cannot see any difference if you hold them up side by side. One car is black and the other is a cream color. But superficially the bumpers look the same. Yet the bumper in my right hand is connected to the frame by a straight bracket, and that car will suffer substantial damage in crashes, as the Insurance Institute for Highway Safety has shown.

If you go one step further for the consumer and look at the sticker price of the car and at the EPA fuel economy rating to see if you see a difference, there is no difference. The base price for these two cars is the same. Yet the consumer with the one car will get hundreds of dollars of reduction over the life of the car from these low-speed crashes, and in the other they will not get that protection.

The EPA fuel economy ratings for the models with 5 and 2.5 bumpers are no different. It is the same EPA fuel economy rating. So if there is a fuel economy gain, it is too insufficient to measure so that the auto companies cannot report it to the consumers.

The Center for Auto Safety is already beginning to get some letters from consumers around the country indicating and supporting just what the Insurance Institute for Highway Safety said earlier; that is, consumers are upset, to say the least.

An individual who had bought Hondas for a long period of time said that he was shocked and dismayed to read that Honda was one of the few automakers to switch back to cars with 2.5-mile-an-hour bumpers. He said, "There is no way that I will buy any car that does not meet the 5-mile-an-hour test. In fact, I would pay extra, perhaps \$200 or \$300, to have such a bumper installed as an option."

Unfortunately, he does not have the option. It is one way with 2.5-mile-an-hour bumpers being standard equipment with that Honda.

Another individual who had been buying Volvos stated to us, "I am a bug about safety and this is very important to me, and I would not have purchased the 1983 Volvo had I been told of the reduction to 2.5 miles per hour."

Another individual bought a 1983 Reliant. He said he specifically bought it based upon the statement in the brochure that it contained energy-absorbing bumpers, as standard features. Yet when he got the car, sure enough it had the straight bracket. He asked the salesperson about it. The salesperson said, well, if you had read the fine print it says we have the right to change features without telling you. The consumer drove away with the car with 2.5-mile-an-hour bumpers and very unhappy about it.

One has to ask if the American public so strongly supports 5-mile-an-hour bumpers, then why are some of the auto companies switching back to 2.5-mile-an-hour bumpers? I would like to suggest that the answer is that the auto companies appear to be seeking to sell more cars from planned obsolescence and to profit from repair costs. There simply is no other reason.

Indeed, just prior to the passage of the Cost Savings Act, which required the bumper standards, the average age of a car in America was about 5.5 years. Since the introduction of the safety-only 5-mile-an-hour bumper in 1972, to the no-damage bumper in 1979, the average age of cars in America has gone up to 6.9 years, an increase of 1.4 years.

I would like to suggest that one of the factors that causes the American public to hold on to cars longer is that they suffer less damage in accidents because the consumer who buys a new car or the consumer who has a used car is much more likely to get rid of it to have it phased out of the marketplace if it needs repairs. Indeed, as far as the auto repair parts go, there is a monopoly situation. The only person from whom you can buy a new bumper or a new fender is a General Motors or a Ford or a Volvo or a Honda manufacturer. They are the only ones who make crash parts.

Based upon our survey, the outlook for return of 5-mile-an-hour bumpers in the marketplace is bleak. We did not see the manufacturers advertising better bumpers in the past. We do not see them advertising them in the future. What we do see the manufacturers doing is going to 2.5-mile-an-hour bumpers. For that reason the Center for Auto Safety has filed suit to overturn the relaxation of

the 5-mile-an-hour bumper standard as the best means to get the better bumpers back on the cars which the American public wants.

I would be happy to answer any questions.

Senator DANFORTH. Thank you very much.

Let me ask you a question about where we go from here, assuming Congress wants to do something about it. One approach would be to provide for stickers on cars that just announce the bumper standard that is on that particular car, on the theory that the consumer informed as to bumper durability can make the right choice. Would that be adequate from your standpoint?

Mr. DITLOW. No; we would like to see the 5-mile-an-hour bumper standard for all cars, because one fact of life with the automobile companies is that if a piece of equipment is standard equipment as opposed to optional, the price is much lower. Your economies of scale go up. You do not tool for two different features. So by having the 5-mile-an-hour bumper mandatory, you get more benefits.

The second factor is that if we continue with 2.5-mile-an-hour bumpers, if we cannot convince the Department of Transportation and the courts to overturn their decision, then it is a fallback that would certainly give consumers something. The one thing that we cannot understand is why the Department of Transportation itself when it began to get the information from the auto companies did not put it out in November and December as that information came in to the agency.

But right now you have no information. The free market cannot possibly work if we do not have the information.

Senator DANFORTH. Senator Exon.

Senator EXON. Well, I had the same question that my colleague just asked you about. We have a desire here to try to get away from all these rules and regulations and redtape and get government off the backs of people.

I do agree that I think that the Government has a place to step in when somebody thought they were buying an approved accepted bumper, and then in the fine print, I think that is tragedy, but you know, we tell them that they have to post on the car the price and we tell them all of this. We tried to get into used cars and tell them they have to certify that they know this is sound and all of that.

Following up on what Senator Danforth asked you, suppose we passed a law that said if they are below 5 miles an hour, they have to put a sticker on there that this has got a lousy bumper? Do you not think that would bring attention to it and simplify the whole thing without us trying to tell somebody how they have to manufacture an automobile?

How far do we carry it? Do we have to say that they have got to have a collapsible steering mechanism so that when they crash—I just wonder, how far do you think we can go? If we can provide legislation so that we can reasonably assume that the purchaser can make a choice and knows about it, is that not the best way to go rather than to start dictating how things are manufactured?

Mr. DITLOW. Well, perhaps, Senator Exon, we have different philosophical viewpoints on this. We believe that where you have such a demonstrated cost-saving technology and where you can

save additional money by making it standard, that we should go forward with it.

But we would agree that at the very least, putting the sticker up there that says the car has 2.5-mile-an-hour bumpers on it. And then I would go one step further, if you compare the damage level in dollars that you are going to have in a 5-mile-an-hour collision with that 2.5-mile-an-hour bumper, then that would put a lot more pressure on the manufacturers to stay with the 5-mile-an-hour bumpers.

The one thing that we must remember is that due to the concentration in the automobile industry, in the past when there is an option, they have not extolled it through advertising. We have not really seen a meaningful option in the marketplace for consumers to pick up.

In other words, when we leave it optional and we just simply say, you are going to have this minimum level and we are going to make you tell the consumers about it; the fact is that the better bumpers are not offered as an option. So consumers are deprived of the freedom of choice because everyone just says, we will put the sign up, we will say it has 2.5-mile-an-hour bumpers and that is just going to be a fact of life.

Senator EXON. Well, of course, my theory to carry it on out is if you have a sticker that says this has got a lousy bumper on it, they could not sell very many of the cars. Now, maybe that is not true.

Mr. DITLOW. If everyone offers lousy bumpers, then everyone will sell them, whatever proportion of cars. What we have to break is that barrier where we need at least one and, hopefully, at least one-half or three-quarters of the marketplace offering the better bumpers. Our fear is that based upon past performance, the marketplace will not bring forward the bumpers.

Senator EXON. Thank you.

Thank you, Mr. Chairman.

Senator DANFORTH. Thank you, Mr. Ditlow.

[The statement follows:]

STATEMENT OF CLARENCE M. DITLOW III, DIRECTOR, CENTER FOR AUTO SAFETY

Mr. Chairman and members of the Committee, thank you for the invitation to testify on low speed collisions and bumper protection on 1983 model cars. I am the Director of the Center for Auto Safety, a non-profit consumer group founded by Ralph Nader and Consumers Union in 1970 but independent of both since 1972.

From the fall of 1978 through the fall of 1982, new cars came equipped with lightweight bumpers that protected against damage in 5 MPH crashes into fixed objects, the equivalent of hitting a similar parked car at 10 MPH. According to surveys by the Opinion Research Corporation, fully 92 percent of the American public believe this level of protection is a good feature in new cars. And 68 percent of the public place the value of this bumper protection at a minimum of \$100 even though 5 MPH bumpers add no more than \$40 to the price of a new car. The U.S. Department of Transportation under the Carter Administration estimated the 5 MPH bumper standard would save consumers over \$400 million annually.

Despite this overwhelming public support for 5 MPH bumpers and the previously demonstrated cost effectiveness thereof, the Department of Transportation under the Reagan Administration rolled the bumper protection standard back to 2½ MPH in July 1982. Since a 5 MPH crash is four times more severe than a 2½ MPH crash, the bumper protection required for 1983 cars is one-fourth that required for 1982 cars. DOT's stated basis for this four-fold reduction in bumper protection was the promise of lower sticker prices and improved fuel economy.

The center bumper survey

When the 1983 model year began, it became clear that many 1983 models would have degraded or weakened bumpers. Yet neither the auto companies nor the DOT's National Highway Traffic Safety Administration (NHTSA) told the public which models had which bumpers. Consequently, the Center for Auto Safety set out to survey the 1983 models to obtain this vital information for new car buyers. The Center wrote to the car companies, visited car dealers and obtained information from NHTSA to determine which 1983's had better bumpers so that consumers could buy these models.

Survey results—Half of 1983 models will have poorer bumpers

Of the auto companies surveyed, 8 revealed that they planned to keep 5 MPH bumpers on their cars for the entire 1983 model year. An additional 3 manufacturers indicated they would keep 5 MPH bumpers on some of their 1983 models but reduce bumper protection on their other models. A comprehensive listing by manufacturer and model is given below. (The complete survey is submitted for the hearing record as Attachment A.)

1983 MODEL BUMPER RATINGS

GOOD

Ford	General Motors	Chrysler
All Models	Buick Electra	Plymouth Grand Fury
BMW	Buick Skylark	Dodge Diplomat
All Models	Cadillac Cimarron	Dodge Mirada
Mazda	Cadillac Fleetwood	Chrysler Cordoba
All Models	Chevrolet Chevette	Chrysler Imperial
Mercedes	Chevrolet Monte Carlo	Chrysler New Yorker
All Models	Oldsmobile Omega	5th Avenue
Nissan	Oldsmobile Cutlass Ciera	Volkswagen
All Models	Oldsmobile Cutlass	Audi 5000
Saab	Calais	Audi Quattro
All Models	Oldsmobile Cutlass	Jetta
Subaru	Cruiser	Quantum
All Models	Pontiac Phoenix	Rabbit Convertible
Toyota	Pontiac Bonneville	Scirocco
All Models		

POOR

Honda	Chrysler	Chrysler
All Models	Plymouth Reliant	Chrysler LeBaron Sedan
Volvo	Dodge Omni	Chrysler New Yorker E
All Models	Dodge Charger	Chrysler Town & Country
Chrysler	Dodge Aries	Volkswagen
Plymouth Horizon	Dodge 600	Rabbit Made After
Plymouth Turismo	Dodge 400 Sedan	1/10/83

INADEQUATE

AMC	General Motors	General Motors
All Models Made After	Chevrolet Camaro	Oldsmobile Toronado
1/7/83	Chevrolet Caprice	Pontiac Firebird
Renault	Chevrolet Cavalier	Pontiac Grand Prix
All Models Made After	Chevrolet Citation	Pontiac 1000
1/7/83	Chevrolet Impala	Pontiac 2000
General Motors	Chevrolet Malibu	Pontiac 6000
Buick Century	Oldsmobile 98	Cadillac DeVille
Buick LeSabre	Oldsmobile Cutlass	Cadillac Brougham
Buick Regal	Supreme	Cadillac Eldorado
Buick Skyhawk	Oldsmobile Delta 88	Cadillac Seville
Buick Riviera	Oldsmobile Firenza	

On an industry wide basis, the survey found that fully half of all models sold in the United States in 1983 will have weaker bumpers. Of all the companies surveyed, Ford Motor Company clearly leads the industry. Not only has Ford kept 5 MPH bumper protection on all its 1983 models but also has committed itself to keeping

better 5 MPH bumpers on 1984 models. Even manufacturers such as BMW, Nissan and Mercedes-Benz which have 5 MPH bumpers on all their 1983 models said they were considering less protective bumpers or would not commit themselves to 5 MPH bumpers for 1984.

The relaxation of the 5 MPH bumper standard has had an impact on Ford's bumpers nonetheless. When the standard was 5 MPH, Ford had some models such as the Escort which did substantially better than the standard and provided protection in 7½ MPH crashes. With the reduction of the standard to 2½ MPH, Ford has moved to thinner gauge metals and other changes that will reduce their bumper protection. Some borderline Ford models may no longer meet Phase II of the 5 MPH bumper standard which required no damage to the bumper itself as well as to the car.

Perhaps the most bizarre change goes to Chrysler Corporation. On its K-cars, the Reliant and Aries plus their derivatives, the Dodge 400 and 600, the LeBaron and Town and Town & Country, Chrysler went to 2½ MPH bumpers in the front and 5 MPH bumpers in the rear. This is just the reverse of where NHTAS said cars needed more bumper protection. The suggested reason for Chrysler's failure to drop the 5 MPH bumper in the rear is that their cars could not pass the 30 MPH fuel tank crash standard with the weaker 2½ MPH bumpers.

Honda and Volvo hit bottom

Only two manufacturers, Honda and Volvo, rolled back bumper protection on all their models for the entire 1983 model year. Such an anti-consumer decision from these two companies known for their otherwise socially responsible positions can only be termed a shock. Previously leaders in developing technology such as seat belts, 3-way catalysts and more efficient, clean burning engines, Volvo and Honda hit bottom below all other companies in bumper protection.

Honda's and Volvo's decision to degrade their bumpers is all the more backward since their closest competitors chose to go with 5 MPH bumpers for the entire 1983 model year. Thus Honda's Japanese rivals, Toyota, Mazda, Subaru and Datsun all kept 5 MPH bumpers. For consumers picking between these cars, there is now a clear distinction where previously there was none. Similarly, Volvo's technical competitor, Saab, elected to go with 5 MPH bumpers even though it could also have used the less protective European bumper on its cars imported into the United States just as Volvo did.

Looks Deceive as 2½ and 5 mph bumpers look alike

For a consumer looking for a better 5 MPH bumper, the outward appearance of the 1983 models is no help in deciding which cars have which bumpers. This is best brought out by some of the 1983 Chrysler K-cars. Chrysler produced some early 1983 K-cars with the 5 MPH bumper system while later K-cars had 2½ MPH type bumpers using straight brackets rather than energy absorbers. As shown in the following photographs taken of 1983 Dodge Aries on dealer lots, there is no external visual difference between the two front bumpers even though the black car shown in the first photograph should sustain no damage in a 5 MPH crash while the light car in the second photograph should sustain serious damage in the same crash. The only way for a consumer to tell the difference between the two cars is to get down on his or her hands and knees and look under the front bumper to see whether it has an energy absorber or a straight bracket connecting the bumper to the car's frame.

No sticker price reductions—poor bumpers cost as much as good bumpers

Despite industry claims that consumers would save money with 2½ MPH bumpers, the Center could not find any sticker price reductions on any of the cars with the less protective bumpers. The Chrysler cars examined on the dealer lots had no listed differences in the sticker price for cars with weaker bumpers as compared to cars with 5 MPH bumpers. Similarly, no difference in sticker price could be found between those GM models which had 5 MPH bumpers and those with degraded bumpers. Yet these same manufacturers alleged consumer price savings of \$30 to \$40 in successfully urging relaxation of the bumper standard. Once again, consumers and consumer groups who told NHTSA there would be no price savings if the standard were relaxed were correct while industry's claims proved illusory at best.

No fuel economy improvement either

Another claim the car companies successfully used to obtain relaxation of the 5 MPH bumper standard was that 2½ MPH bumpers would result in fuel economy gains. Once again, the Center's survey of dealers could find no improvements in fuel

economy based on the posted EPA fuel economy ratings for cars with the weaker bumpers over the 5 MPH bumper equipped cars.

Consumer reaction to 1983 models with 2½ mph bumpers

When consumers learn that the 1983 models they have bought or are about to buy have 2½ MPH bumpers, they are outraged to say the least. For example, R. Kessler of Potomac, MD wrote Honda's President T. Chino: "As the happy owner of a 1978 Honda Accord, I was shocked and dismayed to read that Honda is one of the few auto makers to have switched back to producing cars with bumpers that withstand a crash at 2.5 miles per hour. Shocked because . . . producing a car that can so easily be damaged, causing hundreds or thousands of dollars of auto body repair work at a speed that is little more than coasting, does not meet that test of cost efficiency. And dismayed because I have dearly wanted to continue buying Honda as each one needs replacing. Yet there is no way that I will buy any car that does not meet the five-mile-per-hour test. In fact, I would pay extra—perhaps \$200 or \$300—to have such a bumper installed as an option."

H. Galvin of Bethesda, MD was not so lucky—she learned about the 2½ MPH bumpers on 1983 Volvos from an article only after buying one: "My reason for writing to you is that yesterday when I was reading the newspaper, in the Business Section was an article that stated 'Volvo has switched to weaker bumpers in the 1983 models which can result in higher accident repair costs and hundreds of dollars in damage in low-speed crashes, having changed from 5 mph bumpers to 2½ mph bumpers'. I could not believe what I was reading since I bought the VOLVO only because of the safety features with 5 mph crash bumpers and was told the 1983 was positively same as 1982 year. The point is I am extremely unhappy because I wanted the VOLVO with 5 mph bumpers as I was told by each dealership I would be getting them if I purchased the '83 Volvo. I am a bug about safety and this is very important to me and I would not have purchased the 1983 Volvo had I been told of the reduction to 2½ miles per hour."

R. McGarrah of Washington, D.C. also thought he was getting 5 MPH bumpers when he ordered a 1983 Plymouth Reliant: "When I ordered the car, I specifically relied upon the description of the car contained in your '1983 Plymouth Reliant' brochure, which states that 'Bumpers—Energy-absorbing' are standard features. Even the sales representative from whom I ordered the car was today unaware that you have switched to these cheaper, less protective bumpers."

Chrysler's only response to Mr. McGarrah was that the fine print on the equipment brochure let Chrysler change standard features without notice.

Planned obsolescence and crash repair profits

With such strong consumer demand for and benefit from the 5 MPH standard and no great cost savings to manufacturers evident in the rollback, auto companies appear to be simply seeking to sell more cars from planned obsolescence and to profit from repair costs. Just prior to passage of the Cost Savings Act requiring bumper standards, the average age of cars on the road in the U.S. was 5.5 years. Since the introduction of the safety-only 5 mph front bumper standard in 1972 to the no-damage 5 mph front and rear bumper standards in 1978, the average age of cars on the road has increased to 6.9 in 1981. Better bumpers are apparently a major factor in enabling consumers to hold on to their cars longer and to buy fewer new cars. In addition to selling more cars, auto manufacturers benefit from a weakened bumper because they alone produce crash parts such as bumpers and fenders. Manufacturers can charge monopoly prices to repairs shops, which in turn charge consumers higher prices.

Return to 5 mph bumpers

While publication of bumper ratings will enable consumers to buy cars with better bumpers in 1983, the outlook for continued voluntary production of 5 MPH bumpers for 1984 and later model years is bleak. In view of this, the Center has filed suit to overturn NHTSA's relaxation of the 5 MPH as the best way to get the better 5 MPH bumpers back on the road.

[The following information was subsequently received for the record:]

QUESTIONS OF THE MINORITY AND THE ANSWERS THERETO

Question 1. What would be the most effective way to inform the public about a car's bumper system protection?

Answer 1. The most effective way to inform the public about a car's bumper system would be to place a sticker on the window which would list the cost of repairs to the car in 5 MPH and 7.5 MPH frontal barrier and comparable pendulum or corner impacts. Just as the new car assessment program of NHTSA tests crashworthiness at 35 MPH or 5 MPH about the impact speed of "Standard 208" to determine which cars exceed the standard, it is important to test bumpers above the requirements of the standard to determine which ones are superior bumpers.

Question 2. In your statement you note that since the introduction of a bumper standard in 1972, the average age of cars on the road increased from 5.5 to 6.7 years in 1981. Do you have any evidence of a cause and effect relationship as to these two figures? Do you believe the average age of cars will decrease with institution of 2.5 mph bumpers?

Answer. 2. Although no one has established a definitive cause and effect relationship between bumper standards and average car age, data on the age of cars obtained from the Motor Vehicle Manufacturers Association and others show that there is a clear correlation between strengthening bumper standards and increased car age. It is my belief that reducing the bumper standard to 2.5 MPH will result in decreased car age over time as these cars will not be able to withstand the wear and tear of normal car life as well as ones with 5 MPH bumpers.

Senator DANFORTH. Next we have Douglas Fergusson, representing the National Association of Independent Insurers.

STATEMENT OF DOUGLAS M. FERGUSSON, DIRECTOR, NATIONWIDE INSURANCE CO., REPRESENTING THE NATIONAL ASSOCIATION OF INDEPENDENT INSURERS, ACCOMPANIED BY CHARLES A. TAYLOR III, LEGISLATIVE COUNSEL

Mr. FERGUSSON. Mr. Chairman, members of the committee, my name is Doug Fergusson. I am director of safety services for the Nationwide Insurance Companies of Columbus, Ohio. I am pleased to be here today representing the National Association of Independent Insurers, a national trade association of more than 500 property casualty insurance companies whose members provide nearly one-half of the automobile insurance coverage written in the country.

NAII appreciates your invitation to appear before the subcommittee to discuss disturbing developments regarding the effectiveness of automobile bumpers, developments which could result in bumpers four times less effective than those which have recently been in use.

Last year the National Highway Traffic Safety Administration weakened the Federal bumper standard from 5 miles per hour to 2.5 miles an hour. Many of us in the insurance industry think this decision is contrary to the intent of Congress in passing the National Traffic and Motor Vehicle Safety Act and the Motor Vehicle Information and Cost Savings Act of 1972, and that the decision is unsupported by the rulemaking record which the agency developed.

The decision is currently being challenged in the courts by State Farm and the Center for Auto Safety—I might add, a case in which we filed a brief in support of yesterday.

We believe the reduction of the standard from 5 miles an hour to 2.5 miles per hour will result in more costly low-speed collisions which will adversely affect American car owners and insurance buyers.

The history of efforts to increase bumper protection shows just how far we had come in improving car bumpers until this decision abruptly halted that progress.

In the early 1970's many insurers tried to encourage production of cars with improved bumper designs by lowering the collision coverage portion of automobile premiums for cars equipped with improved bumpers. Discounts were offered in expectation these better bumpers would result in reduced claims. Not much improvement was noted, however, until the States and the Federal Government started setting or considered setting minimum requirement for bumper protection.

Insurers began to see improvements in bumpers during the decade of the 1970's. The "egg-shell exteriors" which Congress was concerned about when it passed the Motor Vehicle Information and Cost Savings Act in 1972 were slowly replaced with improved bumper systems. A Highway Loss Data Institute study in 1980, for example, reported a substantial reduction in both claim frequencies and claim payments in 1972-78.

Recent publicly released data from State Farm and Allstate Insurance Companies demonstrate the benefits flowing from the Government's 5-mile-an-hour bumper regulation. The standard which finally evolved required bumpers, beginning with model-year 1980, to be capable of preventing damage not only to safety-related equipment but also to the front and rear of the exterior face of the automobile and to the bumper itself.

Allstate, for example, compared data from 1980 models with earlier 1971-74 models and concluded that the new bumpers provided cost reductions of about 44 percent in frontal and 60 percent in rear impacts when compared with 1971, 1972 models and reductions of 30 percent in frontal and 53 percent in rear impacts when compared with 1973, 1974 models.

Two things concern us about the agency's decision to roll back the clock on bumper protection. First, the 2.5-mile-an-hour bumpers will offer car owners far less protection than the 5-mile-an-hour bumpers. The 2.5-mile-an-hour bumper is not just half as effective but about four times less effective, because of the laws of physics. Stated another way, the resulting decreased protection will be on the order of 75 percent.

Second, the less protective the bumper is, the more often low-speed crashes can be expected to occur which will result in damage, and the more costly that damage will be. This, in turn, will result in higher consumer losses and higher insurance premiums because of higher claim costs.

As car owners seek ways to contain insurance costs, they will seek higher deductibles. And in fact, many insurers recommend higher deductibles to customers seeking to lower insurance costs. This will mean that a greater portion of low-speed crash costs will be assumed by the auto owner.

Measuring the extent of these increased losses is difficult. In my opinion, the result of the rollback in the standard to 2.5 miles per hour will be very much like having no standard at all; and so substantial cost increases can be expected in the collision and property damage liability portions of insurance premiums.

At the NHTSA hearings on this matter I said increases could be between \$22.50 to \$150 per year, depending on various rating factors such as vehicle location and driver age.

Unfortunately, it is too early to say just how and when insurers will respond to the increasing numbers and amounts of claims resulting from the 2.5-mile-an-hour bumpers. Some companies may impose surcharges or higher rates on cars with poorer bumpers, in those States where this is permissible. Others may wait until they have developed actual experience for 1 or more years. In the event higher rates are not forthcoming, some companies may use tighter underwriting standards for vehicles with weaker bumpers.

In conclusion, let me say that we in the insurance industry are extremely disappointed by NHTSA's decision to deny consumers the minimal protection they enjoyed with the 5-mile-an-hour bumper standard. We think it is definitely a step backward, especially since the technology is available to produce 10-mile-per-hour bumpers.

If the Federal Government's bumper standard is not going to be effective in preventing damage in accordance with the intent of Congress in passing the Cost Savings Act, and instead merely pre-empts the States from acting, then perhaps consideration should be given to terminating the program in the interest of regulatory reform.

Thank you again for your invitation to appear before you today. I will be happy to answer any questions you may have.

Senator DANFORTH. Thank you very much.

Well, I think the key point you made is that, in your judgment, the cost of insurance to drivers will go up as a result of NHTSA's decision. That is your testimony?

Mr. FERGUSSON. That is correct, Senator.

Senator DANFORTH. Anywhere from about \$22 to \$150 per year per car?

Mr. FERGUSSON. Yes.

Senator DANFORTH. Let me just make one comment to you, Mr. Fergusson, because I have been asked what we are doing at these hearings and what my view is of what Congress should be up to. This is the first of 3 days of hearings on the general question of auto safety. I want to wait until those 3 days are completed before I come out with any definitive position.

But my initial view is this: I think that as a general principle, Congress should pass statutes which set out a basic policy and then allow the implementation of that policy, the specifics to be filled in by administrative agencies.

I think Congress has done that with respect to auto safety. I think that what we have seen in the last couple of years is that the National Highway Traffic Safety Administration is, instead of implementing the policies of Congress, busily undoing them.

Your comment at the end of your statement is quite right, in my view. If this is the way we are going, why not in the name of regulatory reform just scrap the whole thing.

But I think that if the administration and the National Highway Traffic Safety Administration and the Department of Transportation decide that its function is going to be to reduce safety standards, whether it is in bumpers or whether it is in passive restraints or whatever, than Congress has no alternative but to fill the vacuum that has been created by the departure of the administration from this particular area and act legislatively.

I do not know if you have any comments that you would like to make on that, but that is my view at the present time.

Mr. FERGUSSON. Senator, I could not improve upon those remarks.

Senator DANFORTH. Senator Exon.

Senator EXON. Thank you, Mr. Chairman.

Well, Mr. Chairman, no one asked me how I felt about this, but since it has come up, I will tell you. I am at these hearings to try to learn. I have a total open mind on this. I basically feel that we should get out of regulations as much as we can, but I generally have been strongly supportive of things that are in the interest of the consumer. And I think that that is what the people basically want us to do.

Yet we hear more than ever about getting the Government off our backs. That was the hue and cry in the recent Presidential campaign. And I would like to do that whenever I can.

I keep coming back, though, and the reason I am asking the question that I am, is there a better way to do it? Now, I believe I understood you to say in your testimony that there was a time when the insurance companies—and I asked this question, I believe, of Mr. O'Neill earlier; maybe you can give me a better reply—you said that there was a difference in the premiums at one time, but it was ineffective. Is that correct?

Mr. FERGUSSON. Might I just say at the outset, Senator Exon, that I sat in the gallery this afternoon and listened to you ask some very good questions. Let me try to clarify that, that back in the early 1970's, at the same time that rulemaking was going on to determine whether indeed the American auto buyer would be treated to some improved exterior protection, we tried to hasten that day by offering economic incentives; that is, insurance premium discounts to auto owners who had cars that could demonstrate improved protection.

At that time, there were multitiered discount plans because there were different bumper styles. There was 2.5 front, 2.5 rear, and then 5 front and 2.5 rear and then 5 and 5. So there were various tiers of discount plans available to the public buyer. They ranged anywhere from 5 percent on up to 15 or 20 percent, again depending upon that protection.

Those discounts remained in place until the rule went into effect, and the exception, if you will, that better cars generally became the rule, that all cars then were beginning to comply, and then those discounts were discontinued in favor of an overall base roll-in in where the improved operating experience, as you have seen it related in data from earlier witnesses, began to show up in the overall rating structure. So those discounts were discontinued.

Now, what I have suggested as the corollary to that, or the flip to that, is that if we are going back to those days then if for no other reason than pure commonsense, you can see that we would expect a reverse in the pricing response.

Now, I must remind you that we are a State-regulated industry. We must in most instances file for what price action we take based upon operating experience. You have referred to a marketplace mechanism. A recent innovation our industry has is what is referred to as model rating that many of the automobile insurance

companies employ that directly reflects the real-world crash experience of given make and models of vehicles.

Now, it has a couple of drawbacks. One is that it takes generally 3 years of operating experience to truly start to reflect what the real-world crash loss cost situation is. So there is considerable lag time there. I think that that is one feature that will probably mitigate against that type of marketplace factor, working to pressure design decisions.

I must confess to you extreme pessimism, given the history of those design decisions in the industry as it regards safety and other loss-reducing features, that there is going to be much innovation. It occurs to me and other observers that the standard of conduct is one of lowest common denominator.

And I just cite those as concerns I have that the type of mechanism you would hope would operate freely in the marketplace is not going to be totally satisfactory to get that job done.

Senator EXON. Or putting it another way, I guess people buy automobiles because they like the looks of the automobile. They buy the sales pitch on the automobile, and then they do not buy automobiles with much attention to safety costs. They are interested in how many miles per gallon but they are not interested in how much it is going to cost them to repair a fender.

Mr. FERGUSSON. And I think, as I have noted in my testimony, that with the increased use of higher deductibles, that the consumer particularly at time of purchase is not going to be mindful of the fact that for the so-called parking lot fender-benders that he is going to be his own insurer.

Senator EXON. Thank you. Thank you, Mr. Chairman.

Senator DANFORTH. Let me just add one point, Mr. Fergusson. It is not as though we are letting the marketplace decide strictly. We had a 5-mile standard; we now have a 2½-mile standard. Government is in the business of setting the standards. Government is in the business of setting a lot of standards on auto safety with respect to steering wheels, padded dashboards and so on, and it does have a bumper standard and it has had a bumper standard for sometime.

Nobody is proposing, that I know of, that we have no bumper standard. The question is what bumper standard should we have. It seems to me that the worst thing that Congress can do is set a standard and then have it be a bad standard. The worst thing that an agency of the Government could do is set a standard and have it be a bad standard. It is somewhat like having a local police department put up a speed limit sign outside a school saying the speed limit is 75 miles an hour. It is a bad standard and it is worse than no standard at all.

I think that a 2½-mile standard for bumpers is fraudulent, and that the Government should either have an adequate standard or have no standard at all.

Mr. FERGUSSON. I agree with you, Senator. I think that it deludes those who believe that there is going to be some cost payoff, whether that is in fuel economy or purchase price, and you have heard testimony that contradicts that. But I could not concur with you more than that, as I have said, I think the 2½-mile standard is not cost-beneficial.

[The following information was subsequently received for the record:]

QUESTIONS OF THE MINORITY AND THE ANSWERS THERETO

Question. You say, in your statement that modifying the bumper standard from 5 mph to 2.5 mph is contrary to the intent of Congress. Can you explain why you feel that it is contrary to Congressional intent?

Answer. As I said in my statement, many of us in the insurance industry think the decision to weaken the bumper standard from 5 mph to 2.5 mph is contrary to the intent of Congress in passing the National Traffic and Motor Vehicle Safety Act and the Motor Vehicle Information and Cost Savings Act. My comment is based on the legislative history of these two laws which consists of the committee reports and statements of legislators which were made contemporaneously with consideration and passage of these laws.

A good discussion of that material is contained in the brief of Petitioner State Farm in the case challenging the NHTSA order which is pending before the U.S. Court of Appeals for the D.C. Circuit. I understand from State Farm's attorneys that you already have a copy of this brief. In addition, I am enclosing for your information a copy of an amicus brief filed by Reps. Moss and Eckhardt who were very much involved with the development of the Cost Savings Act.¹

Question. Can you explain why reducing the standard from 5 mph will result in more costly low-speed collisions?

Answer. As I said in my statement, the 2.5 mph bumpers will offer car owners far less protection than the 5 mph bumpers. The 2.5 mph bumper is not just half as effective but about four times less effective, because of the laws of physics. Stated another way, the resulting decreased protection will be on the order of 75 percent.

This will result in more costly low speed collisions, as was graphically demonstrated by the testimony of the Insurance Institute for Highway Safety.

Question. You refer in your statement to technology available to produce 10 mph bumpers. Can you provide the Committee with some information about that new technology?

Answer. Several years ago the National Highway Traffic Safety Administration contracted for development of a research safety vehicle (RSV), which would include the latest technological safety equipment which could be produced and sold at a reasonably affordable price. The bumpers developed for the RSV would meet a 10 mph bumper standard.

Also, you will recall that Paul Taylor, President of Taylor Devices, Inc. testified at the hearings about his work on improved bumper systems and designs which could meet a 10 mph standard.

Senator DANFORTH. Thank you, sir. Next, we have Mr. Paul Taylor, president of Taylor Devices, Inc. Mr. Taylor, please proceed.

STATEMENT OF PAUL H. TAYLOR, PRESIDENT, TAYLOR DEVICES, INC., ACCOMPANIED BY O. EUGENE HILGER, VICE PRESIDENT, PROCUREMENT

Mr. TAYLOR. Mr. Chairman, Senators and guests, I am Paul Taylor, president and chairman of Taylor Devices. Two companies I founded, Tayco Developments and Taylor Devices 28 years ago. Tayco Developments is a patent-holding corporation and Taylor Devices produces under them.

We supplied auto bumper shocks for 3 years on AMC cars. This Bumper Shok weighs 2.8 pounds. It was then one-third of what Ford had on the car and one-half of what General Motors used. We are here to tell you we have one that is one-half that weight now, 1.65 pounds.

We were at that time and still are actively engaged in space and aircraft and weapons systems generally, doing about 52 percent

¹ The material referred to has been retained in the committee files.

business normally with aerospace, and 48 percent with steel mills—conveyor lines and so forth and production tooling.

The type of product we make is used on many very critical weapons systems to protect things that are much more delicate than vehicles, under much more stringent conditions. The actual shock absorber that we are talking about started as a suspension for a car, and still would be a much superior suspension. It has been used on the race tracks at Indianapolis. We have tested it there because we have no high speed test facilities, and we were able to keep the wheel on the pavement a little better from the standpoint of safety. It would undoubtedly result in a little better gas mileage.

Now, I have with me Mr. Gene Hilger, one of our executive officers. You are being treated to the geriatric side of our company today. All of our young men are out on the west coast on a missile contract that we are under contract with for shock isolation systems and could not be with us, so we are fronting for the company.

The Bumper Shoks we are talking about, we drive about four test cars. The vehicles are very good for testing many shock absorber problems. And in this particular case, I am driving at the moment a little Mercury LN-7 that Ford has turned out; a very fine car with Bumper Shoks all around. A week and a half ago I backed out of one of these fender-bender situations with the LN-7. I was going approximately three-tenths of a mile per hour. I backed into the rear—skirt of the left front fender of a Plymouth, Dodge Horizon Omni, type and I did 80 dollars' worth of damage.

Now, I speak of that because I am probably a little unique here. I was a service manager for General Motors for a while before I became an engineer and worked in the automobile business and estimated fender repairs and so forth back then. It has never ceased to amaze me, the cost of this type of thing. I was very anxious to get into the Bumper Shok business because I realized what it would do to reduce these costs.

In this particular accident that I refer to, the Bumper Shok we refer to was an early invention. Actually, it started with a patent that I made in 1952. I patented the first compressible rubber spring, which is now in about two-thirds of the vehicle production in the United States. Unfortunately, the patent ran out about the time Ford put it on the car.

Our latest patents are far superior in that they do many, many things. The problem with the Bumper Shoks in service today and why it should continue because there is room for greater advancement, is the temperature problem. The Bumper Shok that was on AMC's car has 700 pounds preload before you move it; before you move it this far, you are 700 pounds. Well, if you back into somebody's fender and that bumper hits it, it will damage it if you hit it on the side skirt. The plastic Bumper Shok which we are exhibiting here, which is to replace the Honda—shock which is 3 pounds, this plastic is 1 pound, 11 ounces. It would not have bent the fender.

The reason is that compressible fluids using molecular compressibility, which I have quite a few patents on, basically change drastically with temperature. To make sure that you have a Bumper Shok operational at -20 , you have to have a preload on the thing of 700 pounds. At -20 you have about 100 pounds; enough to push it out. The compressible rubber unit, which is exemplified by the

Ford shock absorber and the Honda shock absorber, which again is one of my early patents, basically is a little worse than the later version that I have here; the liquid one. It is more seriously changed by temperature.

To minimize it in this particular AMC unit I used a space age material, 75 ST. This was delivered for AMC to \$4.25 complete by Rockwell International. It was licensed under us. But that was with space age material.

The 75 ST impact-extruded cylinder was just squirted like toothpaste and finished in one pass with a 17-4 PH stainless steel piston rod. I will not say that I did not have a lot of trouble in Detroit, but I threatened to cancel the license if anybody changed any of the materials, and I would have done it.

Now, what we are talking about now is a new shock absorber that we first exposed to AMC and Ford sometime ago and we have gotten so busy we have not been back, and that is what we call a cartridge type that was adaptable as an accessory. In other words, you could, say, insist upon the 2½-mile-an-hour bumper shock; you could give them one, and that would be fairly simple—a plastic tube filler. And if somebody wanted to pay the money for an accessory, then you would just snap another one in a plastic liquid spring shock.

This is the type we are talking about now, as exemplified here with a plastic one. You build a car with a plastic tube liquid spring shock. That will stop a Ford LN-7 or a Honda or that type of car, and just give them a piece of plastic that fits in there like that and that will go for one 5-mile-an-hour impact, and you throw it away. Or the guy can pay a little more and get a plastic Bumper Shok to use over and over.

Now, in my opinion—and I have not got all of the prices in yet—this Bumper Shok which is of plastic instead of aluminum shown here, would come in at about two-thirds the price of the previous AMC unit. It is at half the weight.

We are selling these units now for bank installations and shortly, computer installations. This particular type of product has no temperature problems whatsoever. Gene, do you want to show that temperature graph?

If you look at the curves which I have here—and let me say something here. This has been rather an eventful day. We left this morning and I had \$5,000 worth of artist work to bring here, and I left it in my car, so I have made these in the red carpet room at United Airlines between 9 and 11 today.

Basically, the first one would be the graph showing curves for all of the Ford Escort, Pinto and so forth. The shock graph. Now, you will notice that we have in here a space age technology in all of these, which is a very simple device called a fluid amplified piston head. And the fluid amplified piston head is actually a device that senses energy. In other words, if you impact the car, as I did a little Horizon the other day, it senses that it is not a very bad impact and it lowers its load and goes to the full stroke at a very low load. You would not damage the fender at all.

Now, to prove that, we could not arrange a car-to-car by the time we got down here, so I had a local outfit make me up a representative section of the bumper in wood and I applied the same load to

the Plymouth Horizon that I applied when I hit it with the Ford LN-7 but with the load of this plastic bumper shock, and I damaged it not at all, not one bit. I did not even nick it.

Now, what we are trying to get across here is that the technology is available to make these relatively inexpensive and to improve these fender-benders and to cut the cost down to where even the minor type impacts would not be a damage situation at all. I can state with certainty here that had this shock been on my Ford LN-7 I would not have damaged the Plymouth Horizon. And the damage was the whole fender skirt and the bracket. I would say the damage was close to \$80, and I may be a little low because it has been a little bit of time since I used to estimate these.

Now, the units we are talking about here, this is our 9th and 10th generation of product. It started as our 8th, which was just a plastic spring. The first patent was filed 9 years ago and we have continued to work with it. We have worked with it to the extent that we have eliminated half the parts, which further cuts the cost. Instead of having a separate seal and a separate cap and a separate everything, it is a one-piece molding out of plastic. What you see here, the nylon, is one of the structural plastics. This happens to be a unit for an overhead crane in a steel mill that we are experimenting with.

Now, the work has been carried out a little farther. This is a Stealth bomber technology. It is an epoxy filament wound material that is molded into plastic in one piece. If you had, say—given the weight of the car, you could take this one and mold it for up through the Pinto—well, the Escort series up through maybe 3,000 pounds. You could insert a plastic laminate to take it up to an LTD. The same unit. You would have to add the cost of the plastic laminate Stealth bomber technology for the LTD.

All of these have been tested. This is one we talk about, new technology. This one is over 12 years old. To give you some idea of what we are talking about, this particular unit is designed for the hatchback of a vehicle where you have seen cylinders that are now compressed gas cylinders. This one is about 18 years old, and I regularly do this with it [indicating]. You will see it return very slowly. It is about a 200-pound spring down at the end, maximum stroke in a liquid spring, a metal spring like this. That would be a 2,000-pound spring. The ratio is 10 to 1 on spring force.

Now, to stop a vehicle, you do not need much spring. You need enough spring to get the bumper back where it belongs, and you need a very heavy shock force to stop the car. I have some graphs up there. Gene, would you turn that a little more so I can see it?

I have got a series of graphs—and please bear with these. These were done at the Red Carpet room and they are pretty crude and sketched by me hurriedly. These are actual shock curves. The 5-mph curve you see there is this plastic Bumper Shock right here. The other shock, the orange one that you see is the Ford Escort bumper shock, which is right here [indicating]. This, incidentally weighs about 4 pounds. This weighs 1 pound, 1 ounce [indicating] when it is in its whole assembly. This was designed to replace the Honda here; that is a direct replacement and we will probably put it on a Honda and test it shortly.

Now, we have a very unique capability at our plant because of the technology we work in, which is ultra-high pressures. We are operating at 30,000 and 40,000 pounds per square inch. The power steering in your car is 1,000 pounds per square inch, and a 747 it is 3,000 pounds per square inch. We are at 20 or 30 times that pressure. When you hit my Bumper Shok here on an AMC car, it went up to 20,000 pounds per square inch, 7 times the pressure in a 747.

Senator DANFORTH. Senator Exon understands all of this.

Mr. TAYLOR. A whole new series of products are available because of this.

Now, what we have carried on in this use after we got interested in bumpers—and I might add this. We have a reason for being in it. We do not get much business from the automobile business, but we get a lot of business stopping hot uranium cars, hot steel melt cars, train, overhead cranes, and the rest of it. We enjoy a very healthy business in that as well as handling most of our shock loads on many of our military missile and aircraft problems.

With respect to this machine we have, on our own, we have a very interesting test apparatus based upon molecular compressibility where we can accelerate in the laboratory in 1 foot anything you want to accelerate up to 100 miles an hour. We will give you 100 miles an hour at 1 foot.

So, basically, being an aeronautical engineer, I decided to set up some model vehicle bumper systems and filed some patents not too long ago on them in which it is my belief that with the proper 5-mile-per-hour bumper system, it would be possible to set it up in such a way that you will, in some impacts that we see now such as pole impacts or tree impacts, which are very serious, you would probably be able to reduce the loss of life by 50 percent.

This would be done with something we have on test right now. We have a Plymouth Horizon and we started out to try to give it 10-mile-an-hour system. That concept was that the engine and drive train of the car weighs roughly 20 to 25 percent of the mass of the vehicle. If you could stop that, you got rid of 25 percent of the energy to start with. So we coupled a single Bumper Shok from the engine back to the front bumper and put two normal 5-mile-an-hour shocks in the frame rails and increased the capacity of the other car to 10 miles an hour because we are stopping the engine mass directly. I have some patents filed on that, I might tell you.

Now, as we got into this, then we observed—well, what if we just stopped the car with the center shock going into the engine, and if we made it stiff enough with the engine being stiff, we could cause the bumper to fail at the midpoint. It would bring it back at about 45 degrees, and you would cam a car off a tree or a pole or a bridge abutment. In other words, you would divert it, is the word to be used.

We made our own model and put it in our own test apparatus and fired it up to 30 miles an hour, and we have these photographs here which we will show you, along with some other Bumper Shok work we have done. And we were able to successfully protect a hen's egg, which is similar to a human skull, at a 30-mile-an-hour impact by diverting it from the collision. And this is what would normally be a 5-mile-an-hour bumper system if properly designed.

Now, we will also show you some of our early work on cars. I heard some conversation here before about aging of cars. Well, in case you do not know it, every impact of a car at 5 miles an hour ages the car 5,000 miles. If you doubt it, I will take you and show you a Plymouth Horizon or an AMC Gremlin which we have driven into the wall. Most of the time I have driven it—I will tell you, that is what is wrong with me—80 times.

I have hit the wall so far 80 times, and I do not mean to bore you with it, but I can tell you just before you hit that wall there is a moment of terror, even on the 79th time, even though you are only going 5 miles an hour. On three or four occasions we have not worked so well, and boy, I have blacked out, I will tell you, and so have other people who have driven it, too. We are not a big enough company to be able to buy dummies, so I am the dummy.

In connection with this, the three-element bumper system has problems—I was having a problem with the vibration problem and I drove it quite a few miles. We have a very attractive, lovely lady who works in our office who is an assistant, and I could not find out what it is. And I said you drive the car. So she came back and she said, it tickles my feet.

Well, if her feet needed tickling, I am sure her husband could do it, or one of the guys would stand in line at the plant, including possibly Mr. Hilger and I.

Anyway, we took the car and I took my shoes off and tried it, and there is a vibratory problem. We will not tell you that we have a solution to it yet, but it is a viable solution to a car for a 5-mile-an-hour impact with a single Bumper Shok back to the engine, which would not be much more expensive than these shocks.

My problem that I am trying to get across to you—I think I am going to get shot out of Detroit—I think we stopped this technology too soon. We should have continued. There is a definite possibility as everyone works at it, Detroit, ourselves, and everyone else, that we will come up with a safer car and 5-mile-an-hour protection as well.

I wonder if we could see our 16mm films and then I will have a few more minutes.

Now, these are crude. They are not the polished Insurance Institute things. The high-speed photographs were taken by Calspan. We have built several safety cars with Calspan in the past. We are up to 30 miles an hour.

While they are getting set up, I might say this. People say to me quite often, why don't you stop a car at 60 miles an hour? I say, oh, I can stop it at 60 miles an hour; I have got just the shock. And they said, what is that? Well, I take them out and show them a railroad shock 9 inches in diameter, six feet long and weighing 720 pounds. That will do it. Just tell me how to put it in a car.

Now, we can't expect to absorb the energy in a 30-mile-an-hour collision, but we can do something about diverting the car from certain types of collisions like poles and trees and save half these people. Some idea of the cost—and I would assess each one of those human lives at \$50,000 minimum plus the car.

Within a 5-year period in my experience, four people associated with me or with the plant have lost their lives. Two young men working for us, one leaving a Christmas party, hit a tree. He could

have been saved if the vehicle had been diverted. My sister-in-law was killed in a collision in a Camaro. I, personally, examined the car and said if my damn bumper had been on there, it would have saved her life. And three since then that I have looked at. We can do better. Believe me, we can do better and we should do better.

Now, the trick in looking at these photographs, you will see some of the eggs. The problem is you never can be sure that a scientific experiment as good as that depends on which chicken you got the egg from. Obviously, you do not have a consistent shell. So, what you are looking at here, the trick is to make the car continue on, be diverted off and continue on its path so you are not reversing the path or snapping his neck or anything else. If you can get 8 to 10 feet of travel at a 30-mile-an-hour crash beyond the impact, you will not hurt anybody. They will be shaken up a little bit but they will survive, and this is the aim of the system, the advance system we will show you.

First, we will show you two of the automobiles we have that we have worked on before, the little Gremlin, which right now if you look at it, the stress corrosion is set in. And this stress corrosion is so bad you would swear the car had been driven a considerable period of time. The stress corrosion comes from the impacts we have made.

This particular unit is showing a Hornet car, 1971, that has an aircraft quality 17-4 PH bumper on it, which is part of this conversation that I wanted to discuss. That bumper weighs less than the current bumpers because it was made of 180,000 yield material, such as is used in the space shuttle and a few other places. It would take a substantial corner impact, as you will see.

Now, this went to 10 miles an hour back in 1971 with two of these Bumper Shocks like this. You will see a corner impact, and then a little farther down the track, down the path, you will see some other pictures at the same time. I will try to continue my testimony here so we do not take too much time.

But this particular car was put into service in the company making pickups. I was hoping somebody would hit something with it. That may sound strange, but you need experience in the real world, and I got lucky. A young man with this particular car hit an upright at 45 miles an hour on the thruway in the Buffalo area when he tried to pass a truck. He owns up to 45; knowing he was a hot rod driver, I am sure it was probably closer to 55.

He was not injured at all because of the extremely high-strength bumper of stainless steel that we had on there. You will see the damage in a little while. There you have it right there. He hit on that corner, and that bumper was so strong instead of the bumper failing and locking, the bumper to the car, it diverted him from the pole, and that is what started this system. Diverted him from the pole. He went about 50 feet down the road, and while the car was damaged quite a bit, that heavy duty—not heavy bumper; it is a very light bumper, but heavy duty stainless steel bumper, 180,000 pound yield material, undoubtedly saved his life. That was the real world crash.

There is the crash. As you can see, he hit just outside the guard-rail and the bumper was strong enough to just cam the car off and point him on down the road in a different direction and he contin-

ued on. If he had locked onto that pole, he would have been dead, right through the windshield and out on the hood.

Now, having damaged the car, we have probably \$20,000 in the car at the time. I decided to smack the other side at 7.5 miles an hour in our test barrier, and junk the car. So, you will shortly see 7.5-mile-an-hour corner impacts on that car in which we finally got it up to 10, and I think we hit it then at 10 miles an hour. We finally damaged the car.

The important point that I am trying to get across here is that if these face bars were built of sufficient material and you could cause the bumper to fail at the center in the case of a pole impact on either side of center, it would go back and hang up in the frame rail and cam the car off the pole instead of locking onto it. Personally, I think it is a very important feature that should be explored further.

The damage on the rear here was caused by a guy that hit him coming up from behind when the car jockeyed all over the road after impacting the pole. That was not related to the first accident at all.

I will now run a couple of corner impacts in there at 7.5 and 10 miles an hour, and then we junk the car. Incidentally, you will see we have a very sophisticated type of propulsion system at times.

We have our own SAE barrier. That building we are pushing into, we do a lot of space testing up inside of it, and it is a very critical area. That was about a 5 miles an hour. Now we are coming a little faster. I might have been driving this time. Yes; I was. That was 10.

Now, this shows what a very, very strong face bar of suitable aerospace heavy-duty materials will do. Now, that may seem rather difficult, but just before I left for here one of the major steel companies delivered onto my desk 140,000 yield standard steel from a steel company. So, when they go to these higher strength alloys that they are doing now, we are almost there.

This is our Gremlin. That car has now hit the wall over 80 times. This time the hood was off because we were hitting at corner impact and we thought it would be fairly severe. The placement of the bumper guards was predicated on getting the maximum corner impact without damaging the car, and we had to locate those very, very precisely.

The car is being pulled in here at slow speed by our electric tractor. We use that at times because we can control the speed very well.

Now, following this, you will see the high-speed tests in our lab of our machine which we call a Linac. Now, the Linac is a controlled explosion. We contain fluid at up to 40,000 pounds per square inch, and we release it at any pressure. The machine has been used not long ago. For vehicle apparatus people came to us and wanted us to test a whole bunch of little black boxes they were going to try to convince Detroit to put in the car, like the recorder in an aircraft. It would record the severity of the crash. It was an accelerometer.

We checked a thousand inputs on the machine, which you will see shortly.

Here is our center bumper system. And this shows what happens to the car. If you hit on the corner, the bumper deflects back and cams the car off the pole, as shown in the figure 3 of the patent drawing, and it goes on down the road.

This is what happens with a conventional system. The bumper locks on, the car locks on, the guy is dead, very dead. The pole captures the car.

You will now see our high-speed photos. We duplicated a pole. Here is the center Bumper Shok, here is a three-element Bumper Shok which we first started two-frame shocks on either side and one on the engine. That has since graduated to just one in the center, which we are sure we can use, and two tensile straps on either side. Now, that shows the angularity, if properly designed, how you can cam the car off the pole.

Now, very shortly we will be in our final thing here showing our high-speed test acceleration of the small-model car. We actually took what would be a plate which would be a chassis of a car. Here we are, that is our Linac. That will develop 760 horsepower, that red cylinder, and deliver it instantly. He is putting on there a small car model.

The pole in the center is a light pole upside down across there.

That model car even has Bumper Shoks. There are two screws that we put down to put a friction load simulating a two-Bumper Shok frame, and the railcar. Now, we will impact it. And you will see that it reverses with the standard bumper or locks on in case of a car.

The trick is to get that to continue beyond the pole so the passenger is traveling in the same direction and you minimize the damage. Again, that is a view of the same high speed. These photographs were taken, I think, at 800 frames a minute by Calspan for us.

This particular machine is used quite often for high-speed tests. That has tested every landing gear on a DC-10 and Lockheed 1011. It was used on the Saturn 5 space shot. It was used by Calspan for firing a missile across the wind tunnel. And it was used also for automotive testing to simulate bumper impacts.

Again you will see this reversal.

In just about a second we will have the one with the three-element Bumper Shoks. There you are with the three-elements. There are three Bumper Shoks on that. Each one is frictionally loaded to simulate a Bumper Shok absorber in the scale to which we are talking about.

Now, there you will see it flew off to the side. Now, we changed the angle a little bit, and you will see it go on by. And then we put the egg on, and we ran a series of tests with the eggs. We are still bouncing back for about the next two hits. You will see an adjustment of the tension on the shock absorbers. We got it to do what it should.

This is a two-element Bumper Shok with the egg in the cradle, simulating the skull of a human being. The egg either broke fore or aft, and we were able to successfully get two shots with the Bumper Shok when it went beyond that bar and the pole. When it continued on by, we saved the egg.

Now, my purpose in showing you this is to point out that—there you go, now if a passenger was in that car and that was doing it because he is going in the same direction he was going and not the reverse or a dead stop, he would have in all probability not been seriously hurt.

Now, I am not telling you this is a finished technology. It needs obviously to have much, much more work done. It was just to prove the feasibility of it before we filed some patents. That was at exactly 30 miles an hour. We can duplicate it exactly.

Now, in closing my testimony, I understand I am running out of time here, I think what we are trying to get across is that technology is moving to the extent that these Bumper Shoks could be produced at substantially lighter weight at lower cost than they are right now.

Just briefly on the graph, those were actual curves sketched up by me in the Red Carpet Room as I recalled them. I think I am pretty close from the ones I did not bring, the 5-mile-an-hour shows what the Tayco Plastic unit will do. That not only the plastic and all other units do that, they are absolutely flat so there is a limit load on the car. It is 3,000 pounds. That is, most of the others exhibited peak shock force and then decay because they are velocity-sensitive. You can look at the weight. That Tayco Plastic one is 1 pound 1 ounce. The Ford Escort, 3 pounds 14 ounces; and the Honda, 3 pounds. Those weights were taken as it is.

My main purpose in doing this is to show you this technology is very much alive. If Detroit does not buy it, we will sell it to somebody else. But it is here, and it has vast implications in the future bumper system we are showing you there as a possibility if we just continue on its course.

Thank you, gentlemen.

Senator DANFORTH. Thank you, sir.

Let me just put a few questions to you. If you were putting in the technology that you would recommend, what would be the mile-per-hour standard? Would it be a 10-mile-per-hour standard? 5? 2.5? What would it turn out to be?

Mr. TAYLOR. It would definitely be the 5, without any question. That is attainable. A 10, we have three 10-mile-per-hour cars, as you saw there. That might cost the consumer a little more money.

Senator DANFORTH. What would be the difference in cost to a consumer between a 5-mile-an-hour car and a 2.5-mile-an-hour car?

Mr. TAYLOR. And a 2.5-mile-an-hour car?

Senator DANFORTH. Yes.

Mr. TAYLOR. It is the cost of the Bumper Shoks, that is all.

Senator DANFORTH. Which is what?

Mr. TAYLOR. That would be sold to AMC for \$4.25. I would say it is \$6.50 right now. These are four per car if you are talking a single bumper system to the bumper or to the engine.

Senator DANFORTH. I do not know.

Mr. TAYLOR. Well, there are two per car, normally. There is one on each frame rail on either side.

Senator DANFORTH. What is the total difference of the cost of the car with the better shocks rather than what they are now using in the 2.5-mile-an-hour car?

Mr. TAYLOR. Well, to tell you the truth, the plastic will cost them less because it is all molded one piece. That is the point I am making. The technology is coming along, and you are stopping the damned thing before you get a chance to use it.

Senator DANFORTH. So as far as the car companies are concerned, they can do it just as cheaply with the 5-mile-an-hour standard?

Mr. TAYLOR. Let me put it this way: They are still calling me and asking me how I got this one done at 2.8. And I will give you the conversation. I said, well, I am not going to fly to Detroit; if you want to see me, come on down to Buffalo. So they said, OK.

So they called me back 2 weeks later. The particular car company said, OK, we have got clearance to come. And I said, fine. When I was working with you, you stiffed me for \$29,000 royalty; bring the check or do not come. I have not seen them.

Senator DANFORTH. Just to try to zero in on the cost of the car. Is it about the same with the shocks as without them?

Mr. TAYLOR. I cannot see much difference. You have got to put a bracket to hold the bumper up anyway. Here is the bracket here. Here is the bracket and the system. I told you all you have to do is take and put this cartridge in here.

Senator DANFORTH. Why do you not think the car companies want these?

Mr. TAYLOR. I told you I was in the automobile business. I was a service manager first. I started out in the parts department. Come fall, I would hang 200 fenders for Chevrolets and Oldsmobiles up on the ceiling. That is a lot of business. They do not want to lose it.

Senator DANFORTH. So it is their parts business?

Mr. TAYLOR. I am going to get shot out of Detroit, but I will lay it right out on the line. It is economic.

Senator DANFORTH. It is economic, and it is not the cost of manufacturing the car or the price they can get for a car?

Mr. TAYLOR. \$4.25. That is what AMC was paying to Rockwell-International under license from me. The plastic one will come in about \$5 now, and even with inflation it would probably cost, because of the increased cost of the aluminum, the rest about \$6.50, I would judge.

Senator DANFORTH. And the bracket costs how much?

Mr. TAYLOR. You have to have the bracket anyhow. You have to have something to hang the bumper on, so forget the bracket.

Senator DANFORTH. You think that the reason is not to save the cost of manufacturing in the car?

Mr. TAYLOR. The Insurance Institute has already been on here to the effect that they saw no price reductions. I did not, either.

Senator DANFORTH. Well, maybe they are pocketing the difference.

Mr. TAYLOR. Well, they are having a hard time, in all fairness to the guys. They probably are. Frankly, they are having a rough time. I can sympathize with them. The costs are excessive, frankly. I sympathize with them, and I sympathize with them arguing about regulations.

Senator DANFORTH. Your feeling is that when they are making the car themselves the cost between that shock and what they are putting in in place of it is not very great?

Mr. TAYLOR. No.

Senator DANFORTH. How much would it be, do you know?

Mr. TAYLOR. Well, the cost of the shock is \$4.25. You have got four of them. That is \$24 on the car. And you have got a bracket that probably cost you \$2. So that times 4 is \$8. You are talking \$16 additional cost. They are going to say I am crazy, but that is all right.

Senator DANFORTH. But you think that the main reason is that they want to sell parts?

Mr. TAYLOR. Exactly.

Senator DANFORTH. They want a car that gets hurt?

Mr. TAYLOR. Exactly. And I might say this also, Senator, having been in the automobile business, you are far better off if your car does not hit a collision shop in the first place for any damage.

Senator DANFORTH. Have you tried to talk to them? Have they given you the reason why they are not interested?

Mr. TAYLOR. I spent a lot of time in Detroit. I am 68 with a coronary bypass 6 months ago. I do not want to waste my time up there anymore. If they want to come, they can come see me just as I told them. We have all the business we need, we do not need any more. So we are not that anxious to do business with them. If they want to come see me, fine.

Senator DANFORTH. Do they want to come and see you?

Mr. TAYLOR. Oh, yes. I mentioned earlier Ford called and said they wanted to know how we got this one down to 2.4 pounds. And I said, well, fly down and see me. And they came back and said, all right, they would.

And then I said, well, now, bring the check you owe me. And they promptly came back and said, we got 30 engineers working each month and we will figure out how you did it. I said, that is \$30,000 a month. You owe me \$29,000. That sounds like good economics, frankly.

Senator DANFORTH. Thank you, Mr. Taylor.

Mr. TAYLOR. You recognize I am probably going to get cut off here, but I have to call it as I see it.

Senator DANFORTH. OK. Well, I am going to let you go now so you can deal with the car companies.

The hearing is adjourned.

[The statement follows:]

STATEMENT OF PAUL H. TAYLOR, PRESIDENT, TAYLOR DEVICES, INC.

Mr. Chairman, Senators and guests, I am Paul H. Taylor, President and Chairman of two companies I founded 28 years ago; Tayco-Developments, Inc., and Taylor Devices, Inc. Developments is a patent holding company and Devices produces the product under license for our Governments Weapons Systems and Industrial use. Developments has had licenses with Rockwell International, Houdaille, Ford Motors, Lucas of England, General Extrusion, and Automatic Sprinkler in addition to Taylor Devices. With me, is a retired former G.M. and Borden's executive, a Director and Consultant to my companies, Mr. Eugene Hilger. Gene has forgotten more about production than most production types know. Gene offered to help since my son and a team of our engineers are on the West Coast working under contract for a shock isolation system of one of our major weapons systems. We will miss Doug technically, but Gene adds experience.

I am happy to return to your committee a second time since my 1975 testimony, so that I can document the further progress in weight and cost reductions and damage protection on shock isolation systems and bumpers for vehicles since the 1970-73 use of our sixth generation of product. This product was then one-third the weight at approximately the cost of other systems first disclosed here eight years

ago. The Fluid Amplified shock absorber disclosed eight years ago, on which my research company holds patents, differs from other shock absorbers in that it senses energy rather than velocity or pressure. Also in a Liquid Spring Shok the same liquid that absorbs energy in the shock absorber is also compressed to provide a Liquid Spring. This energy system provides a Bumper Shok lighter in weight and smaller in size and provides a reliability unmatched by others. This is proven by substantial uses for critical space, defense, commercial and nuclear applications produced by our production corporation, Taylor Devices, Inc. for Fortunes 500.

RECENT BUMPER SHOCK EXPERIENCE

I had an occasion, last week, to experience the cost of old technology Bumper Shoks. While realigning for parking, I backed into a Dodge Omni hitting it on the left front fender. While our test car, a Mercury LN7, was not damaged, I did \$50 to \$75 damage to the Dodge, which could have been prevented by Plastic Bumper Shocks on my LN7. Estimated velocity of impact .3 mph.

NEW BUMPER SHOCKS

My discussion and testimony today are covering this ninth and tenth generation of this product, Plastic and Composite Liquid Spring Shock respectively, still lighter in weight and lower in cost, yet with improved performance. I will discuss this, first, and its ability to provide better protection at lower cost and weight than our sixth generation product used by AMC which has never been surpassed in performance, weight or life. The latter statement is justified as AMC reported, to me, two years ago, that there had not been one warranty claim in eleven years use on production AMC cars. This is for existing systems.

NEW BUMPER SYSTEMS

The second part of my testimony will be directed toward a new bumper system with still further reduced costs and weight reduction potential and with the added feature that it will reduce deaths and injuries in pole or tree impacts. Because of the unusual nature of our products, we ourselves, have great model test facilities. We have our own laboratory test apparatus which will accelerate a model vehicle up to 100 mph, in one foot or any desired acceleration. If we can, we will show high speed velocity or acceleration movie of this. An element of our system is that you can duplicate high speed vehicle collision like the flight of an aircraft in a wind tunnel. This unusual patented Tayco test apparatus was used by NASA and is currently in use in the wind tunnel by Calspan, In Goodyear Aerospace on the DC 10 and Lockheed 1011 Landing Gear brake test. It is also used for vehicle Bumper testing at Calspan and Consumers Union and for other purposes and applications too numerous to mention here.

DETAILED DISCUSSIONS IN SHOCK DESIGN

First, we will document the improvement in energy absorbers from our sixth generation up to the ninth and tenth generation and how it can reduce weight, costs and damage further. In 1972 we provided Detroit a Bumper Shok energy system one-third the weight of the competing types. A version of this system was used on AMC cars for 3 years. The devices used space age material, such as 75 ST aluminum alloy for the impact extruded cylinder and an aircraft structural stainless steel (17-4PH) for the piston, special silicone for the fluid and Teflon seals. It was price competitive at 1/10 the production volume of the competitive types. In fact, at AMC in the 8 to 10 years they have been in service, there had been no warranty claims against the Tayco Bumper Shok produced by Rockwell International under license. This was the sixth generation of this Molecular Compressibility Energy Absorber.

A seventh generation was a cartridge type for universal use on vehicles. It was still lighter and more versatile. The cartridge type lends itself to an accessory sale of the Bumper Shok. You can use standard rubber in place of the cartridge and sell the Bumper Shok cartridge as an accessory. In the event of damage, you can temporarily replace it with stuffing block to keep the vehicle mobile if the shock is damaged or inoperative. I suggest Detroit, in its own interest, consider the design of the vehicle Bumper System so that a low capital budget, add on accessory of a 5 mph Bumper System could be sold. This would provide for the optional use of 5 mph or even 10 mph damage free bumpers should the customer desire them.

There are many vehicle freaks, like me, that keep Detroit profitable by buying every accessory listed. I always ask—what did I leave off I might want to consider it again? This is very profitable business to vehicle manufacturers.

Gentlemen from Detroit, freaks like me and their option sales are major increments in any profit you show. In invention we turn apparent disadvantages to advantages. Turn your reluctance to sell damage reduction and safety into profitable accessory sales. To the insurance industry—how about a reduction in insurance premiums with 5 mph and 10 mph systems, purchased as an accessory option on the car. Thus manufacturers still using 5 mph bumpers would enjoy lower rates on their vehicles. Let's use the carrot as well as the stick to make things happen for consumer, manufacturers and insurance companies. We are now going to discuss the ninth and tenth generation of this product. In the ninth generation by utilizing a structural plastic such as Nylon and Delrin, we were able to effect a reduction in the internal pressure of the device where by its efficiency and thermal response was improved and its weight and cost reduced still further. Besides the use of plastic cylinder (our eighth generation) the ninth generation employs a molded in seal reducing three separately fabricated parts to one molded part. We have invested \$100,000 in the Molding Dies and tests of this product.

Subsequently for Aerospace, we developed a tenth generation product utilizing the Composite material of the Stealth Bomber in which the high strength filament of plastic is wound in prestressed condition on a Mandrell to enhance the strength of the plastic in which it is embedded. This pressure vessel, the same performance but a little less in size than the aluminum cylinder of our sixth generation, weighs $\frac{2}{3}$ as much and operates with substantially less internal pressure. Since the cylinder and seal are one piece, one molding provides a low cost cylinder and seal. I am exhibiting a Plastic Bumper Shok as compared with the construction of the tenth generation, high technology product that I will not bore you with. For light cars, the Plastic unit, without the Stealth Technology, would be a simple plastic, cylinder-seal molding. The very same unit would have a Stealth technology DuPont Kevlar filament tube inserted in the mold to provide the additional strength for a large heavy car. This manufacturing technique is proven in molds funded by Tayco and is the subject of numerous patents we have filed. We are testing this technology for advanced Aerospace use. There has been some missionary work done on Plastic Suspensions in Detroit by a potential licensee. We have not visited there to discuss this improved device since our first disclosure to them of the plastic technology some nine years ago for bumper shocks and suspensions.

NEW BUMPER SYSTEMS

The objective of this new bumper design is high impact force avoidance in pole collisions (G loading) so as to protect, with minor injuries, adequately belted, passengers in a 30 mph collision with a pole or abutment. I need at least three feet of crush or travel, or stroke of a bumper, and passengers will still be badly injured. We have built shock absorbers for this purpose for safety vehicles tested by Calspan but the cost and structural metal needed to support them are prohibitive.

Occasionally, a stockholder or customer will ask me if I can protect a car at 60 mph. I tell them sure; I have one in stock and I take them to our outside display to show them a shock absorber protecting a rail car impact to 10 mph which is 9" diameter and six feet long and weighs 720 pounds. I say you tell me how to package it. We must remember that energy is $\frac{1}{2}$ mass times velocity squared, so a 5 mph collision adds 4 times the energy requirement of a $2\frac{1}{2}$ mph capabilities. A 30 mph collision must dissipate thirty-six times the 5 mph collision energy. We should design and practice collision avoidance or diversion to cut damage and save lives.

Obviously, we cannot justify the cost and weight for 30 mph protection. However, there is an alternative for a substantial number of collisions into a pole or abutment corner in that if we divert the car from the impact so that it travels on after the impact, we can lessen the vehicle damage and save lives. The trick in pole collision is that the car not lock on to the pole and stop abruptly but be diverted and continue on.

To reduce the G force and save the life of the passenger in a 30 mph collision, preferably the car should move at least 8 to 10 feet after impact to reduce the G load so the passenger lives. Obviously, no shock that you can package or vehicle structure with that amount of crush is acceptable.

DEVELOPMENT OF OUR THEORIES

As we continued our collision work with Bumper Shocks, at times we had to use restraints on the engine, which on several occasions, was knocked off its mounts in 10 mph impacts. When mounts failed at 10 mph this caused us to look at shock isolation between engine and frame and bumper and engine for our test cars.

The concept we are now discussing came about because of this engine mount failure and our attempts to fix it. The engine and drive train are 20 to 25 percent of the weight of the vehicle. I reasoned, if I could couple the engine collision energy to the bumper directly with one additional shock and used the conventional frame shocks, I could make any existing car and bumper pass a 10 mph impact. We have proved this. This test then lead to the conception, if we left the bumper pivot and the forward frame rail structure collapse back to a 30 or 45 degree angle, the car will be deflected off the pole and the passenger will be saved and damage will be reduced.

MODEL VEHICLE TESTS

To prove this principle, we used our own Linac and devised a model bumper shock system on a model car. We then used a hens egg for a human skull and fired the model car at the pole with our Linac and tested the model bumper shock system on a model car. We found we could get the model vehicle diverted from a pole and prevent the egg from cracking at speeds up to 30 mph. We will illustrate this with high speed test photos and diagrams on the Easel. Now, inadvertently, there has been some actual vehicle collision confirmation of this concept on our Hornet Wagon with 10 mph shocks and a very strong aircraft quality stainless bumper we fabricated of about equal weigh to existing 5 mph bumpers. The face bar is probably 3 times the strength of factory bars with respect to deformation, at no extra weight.

INADVERTENT FULL SCALE TEST

After 10 mph tests, this car was put in service picking up parts for Taylor Devices. Our driver, a young hot rod type tried to pass a truck on a divided highway, normally a 55 mile an hour limit. Our usually hot rod type man acknowledges to 45 mph as his impact speed with a vertical pole divider, on the road. The truck squeezed left and he hit the divider upright at 45 mph or over. The stiff bumper failed at the shock and cammed the vehicle off the pole instead of locking on and the vehicle stopped down the road. The camming off the pole and stopping caused him to be hit by a following vehicle on the opposite rear taillight. You can observe the light damage in this 45 mph plus impact and the driver was uninjured. With a conventional Face Bar, he would have been hospitalized.

5-MPH AND POLE IMPACT SAFETY AT 30 MPH

This led to still another concept for a simple 5 mph zero damage, 30 mph (saves lives) systems using only one Shock to the engine but the strong Bumper Face Bar such as we had in 1971 on our 10 mph zero damage Hornet and tension limit stops at the frame rails. This Engine Shock Absorber and the engine in turn, provides a rigid structure center attachment about which the bumper could pivot to divert the car from the pole, saving lives and reducing the damage at up to 30 mph collision. We have proved this concept in the lab. It needs to be tested on a vehicle in a controlled manner. The Hornet accident substantiates the theory.

In closing, I am substantially disclosing advances in the state of the art of 5 mph Bumper Shocks and protection at reduced cost and weight. I am disclosing an advancement beyond this in a new system using an engine shock which will handle 5 mph and improve vehicle safety to 30 mph. Some may say my comments are self-serving, as I am in the energy business. Frankly, my interest is to continue this course in safety and damage reduction, and to save lives whether we gain from it or not with respect to Detroit. I have never improved something that sooner or later it provides a gain.

I assure you we will profit by it as our Bumper Shock development vehicles is now employed on large vehicles with nuclear radioactive material and on hot steel mill cars and other industrial vehicles applications. Thank you for listening to my testimony, I shall be glad to answer any questions you may have.

[The following information was subsequently received for the record:]

TAYCO DEVELOPMENTS, INC.,
North Tonawanda, N.Y., March 3, 1983.

Senator BOB PACKWOOD,
Chairman, Committee on Commerce, Science, and Transportation, U.S. Senate, Washington, D.C.

DEAR SENATOR PACKWOOD: We will attempt to comply with your requests in the letter of February 23rd by March 8th. I believe we will have documented costs of

the Plastic Bumper Shock from reliable suppliers to the automotive industry by then. This material will probably be Federal Expressed on March 8th although it is possible I can get it out March 6th.

Question 1. How much does the Tayco Bumper Shock Cost?

Answer. On volume production, cost is difficult. We have been able to get fast assistance from Dupont's Technical Personnel. They were with us yesterday at the plastic molder, who incidentally produces for GM other plastic parts. We were able to secure his price which is 40 percent of the total Bumper Shock costs. This supplier has been injection molding a quantity of our industrial plastic shocks following our \$100,000 investment in production molding dies. We have been testing these parts off production molding equipment for approximately 1½ years. Initial sales have been made for industrial use.

We are in contact with an old supplier for the other parts of the Bumper Shock. We think we can get his price for the two metal part required on our new Bumper Shock. He manufactured similar parts for AMC on our earlier Bumper Shock.

Question 2. Do you believe that 5 mph or stronger bumper systems would be a desirable option? What do you believe the added cost to the consumer would be for that item?

Answer. Prior to my engineering studies I was an Assistant Service Manager for three large GM dealers. I can state with certainty it is better your car never requires collision damage repair. I can attest to a very high value for a 5 mph Bumper System.

NHTSA erred in reducing the standard. I hope to have documented pictorial analysis of a controlled test to provide documented damage and costs of an actual collision two weeks ago that I was involved in (a fender-bender). This will prove the 5 mph system can have even high value with the latest Bumper Shock technology. It was a grave error to stop this program in its infancy. It has the potential for substantially greater saving in collision damage and a probability, with further work, of saving human life, on which no price can be placed.

Question 3. NHTSA decided to reduce the bumper standard because it found that 5 mph bumpers cost more and weigh more than 2.5 mph bumpers. Those two factors—extra cost and weight—constituted the negative side of NHTSA's cost-benefit analysis. Do you believe there are any additional cost incurred by raising the standard from 2.5 to 5 mph? If so, Why? If yes, what do you estimate the cost to be?

Answer. I do not agree that 5 mph bumper systems should have a premium cost and I am sure that vehicle can weigh less than with the present Bumper Shock of 2½ mph capability. I know from actual tests, with my previous cars, they did not sustain collision damage at 2½ mph with bumper used prior to the initial 5 mph standard. The elasticity or the sturdiness of certain car models prior to the Bumper Standards would take 2½ with any visible evidence of damage. (The sturdy ones are a little harder on the people).

I am sending you this preliminary information so that you will know the trend of my material. I hope that I will be able to provide, in the short time, documented proof of my opinions.

Yours very truly,

PAUL H. TAYLOR, *President.*

P.S. I now have finished my documented tests. Please note the test results appended. Photographs are being processed and a finished test report will be supplied. Enclosures.

PRELIMINARY TEST RESULTS

LN7 BACKING INTO PLYMOUTH HORIZON AT 0.3 MILES PER HOUR

P.S. I have just duplicated the accident. I was involved in a Mercury LN7 test car backing into a Plymouth Horizon four door. Using our two identical test cars to duplicate the accident in a laboratory atmosphere with various bumper shock systems at Tayco.

We duplicated the characteristics of the following bumper shocks for similar light cars, and the following occurred:

	Force	Damage (estimated)
New Tayco plastic shock.....	150#	0
Delco Chevette production shock.....	500#	\$15.00
Tayco AMC production shock.....	700#	\$50.00
Mercury LN7 (Ford production).....		\$80.00

¹Damage seemed identical to the actual accident and the \$80.00 estimate is mine, our insurance was billed \$140.00.

I will get 3 estimates of this damaged fender for my report by March 8th.

TAYCO DEVELOPMENTS, INC.,
North Tonawanda, N.Y., March 8, 1983.

Senator BOB PACKWOOD,
Committee on Commerce, Science and Transportation, Chairman, U.S. Senate, Wash-
ington, D.C.

DEAR SENATOR PACKWOOD: We have arrived at a rough price which would indicate the price of the Cartridge Bumper Shok. Both versions, one version "Tube Shok Cartridge" is good for two 5 m.p.h. impacts. Plastishok Cartridge will take 500,000 impacts. The cartridges are interchangeable. Further economics are possible for both versions. (Please see the reports).

As I testified, the Bumper Shok system was stopped much too soon. In my opinion, a valuable Bumper Shok system would cost the manufacturer \$3.60 extra per bumper shock or \$14.50 a vehicle. At 5 times mark up, this would cost \$72.00 a vehicle. I am sure if it was an option 75% of the customers would add that option.

TUBE SHOK

Tube Shok Cartridge is a system which would cost a little more (\$6.24) than the present bracket on the Honda and would be good for two damage free accidents after which the Tube Shok Absorber Cartridge would need to be replaced. The cost of that to the manufacturer would be \$6.24 extra per vehicle and provide him an after market for replaceable elements.

Now, I would suggest you take whatever reduction in damages attributed to the 5 m.p.h. system by the insurance companies and double it if the latest generation of Bumper Shoks were used. The large percentage of accidents are collision or mild fender-bender similar to the one I recreated after I had experienced it. When I was a service manager, this was the bulk of the collision repairs that we quoted. Now when you have \$80.00 damage you must multiply that by a factor of 3 as to the cost to the owner. From experience, an \$80.00 fender job, if done right, is a three day lay-up of the car at \$25.00 per day for a rental vehicle, that is \$75.00. Now, you must add to this the inconvenience of the customers time in getting the rental car and delivering the car to the dealer for repair. That raises the cost considerably. The multiplied cost on a minor fender-bender is 4 times the accident cost.

As a former service salesman, and I am not proud to say it, I participated in a few rip-offs of customers myself. The pressure in a service department to increase customer labor to satisfy management expectations results in many distorted costs particularly for body work.

As to the specifications I would recommend 5 m.p.h. damage free limits with a provision that in 5 years a pole impact one foot in from the side body line will deflect the vehicle and the G force will not exceed 10 G's up to 30 m.p.h.

Now, there are those that will say that we are after the Bumper Shok business. From my experience testimony in front of a Congressional Committee assures that you can't get any business from Detroit.

Thank you for asking me for my testimony. I am happy to contribute what I can despite the inconvenience this will undoubtedly cause.

Yours very truly,

PAUL H. TAYLOR, President.

[Whereupon, at 3:40 p.m., the subcommittee was adjourned.]

MOTOR VEHICLE SAFETY AND THE MARKETPLACE: OCCUPANT PROTECTION

THURSDAY, MARCH 10, 1983

U.S. SENATE,
SUBCOMMITTEE ON SURFACE TRANSPORTATION,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10 a.m., in room SD-562, Dirksen Senate Office Building, Hon. John C. Danforth (chairman of the subcommittee) presiding.

OPENING STATEMENT BY SENATOR DANFORTH

Senator DANFORTH. This morning we are conducting the second in the subcommittee's series of three hearings on better vehicle safety and the marketplace. Today's hearing will continue our exploration of motor vehicle safety technology.

While our first hearing on February 17 focused on the durability of bumpers, today's hearing will investigate various aspects of occupant protection. We will hear testimony today on the technological issues surrounding airbags, side impact protection of automobiles, and nonlacerating windshields. We will also explore the need for improved design for work vehicles such as truck cabs. This is especially important because vehicle-related accidents are the leading cause of fatal injuries in the work place.

We will explore these means of occupant protection, the effectiveness of current technology and plans for future research and development in these areas. I am also looking forward to hearing representatives of government, automobile manufacturers and the insurance industry when they testify at our third hearing tomorrow as to ways in which government and industry can work to make the safety technology available to the American public.

Senator Hollings has a statement that I will insert in the record.
[The statement follows:]

OPENING STATEMENT BY SENATOR HOLLINGS

This is the second day of 3 days of hearings scheduled on automobile safety technology. I hope that we will continue to come up with ideas to improve automobile safety through these hearings.

Today the Committee will be receiving testimony from a number of witnesses who are involved in the day-to-day research and development of new safety technology. They have experience with passive restraints, side-impact protection, and new car windshield materials. I look forward to hearing them discuss ways to bring their ideas to the attention of the car-buying consumer.

Vehicle safety as an occupational health concern will also be discussed today. Obviously, the integrity of the cab compartment in a truck is a work-related concern to

the truck driver. I will be interested in testimony from both the Teamsters and from Susan Baker of Johns Hopkins who recently completed a study on deaths from work-related injuries, and has some startling statistics on vehicle fatalities that are work-related.

I would like to again commend Senator Danforth, Chairman of the Subcommittee on Surface Transportation for scheduling this series of hearings.

Senator DANFORTH. The first witness is Mr. Ben Kelley, senior vice president of the Insurance Institute for Highway Safety.

**STATEMENT OF BEN KELLEY, SENIOR VICE PRESIDENT,
INSURANCE INSTITUTE FOR HIGHWAY SAFETY**

Mr. KELLEY. Thank you, Mr. Chairman.

In the interest of time, I will attempt to somewhat reduce my lengthy testimony and make a copy of my full testimony available for the record.

Mr. Chairman, each year crash injuries kill thousands of people and damage the brains and spinal cords of many thousands more on the highways. Millions of people are injured less severely and the economic toll of all this mayhem is in the billions of dollars. Detailed figures are well known to your subcommittee. They describe, in sum, one of the worst public health problems in America.

If technological approaches exist to substantially reduce this carnage and economic waste, which they do and have for years, it defies sound public health policy and good economic sense, not to speak of compassion for the sufferers of crash and their loved ones, that they are not available to the buying public even as options. Yet, that is the case today.

The fact is that from a safety standpoint, all but a handful of the tens of millions of new cars offered for sale to the American public during the past decade were obsolete the moment they rolled off the assembly line. The same is true of every car being sold in this country today, in spite of clear, continuing evidence that Americans want safer cars and are willing to pay the additional cost, if any, they involve.

The next portion of my testimony briefly describes the agents of injuries in car crashes and I will pass that. I believe you are very familiar with that.

To demonstrate the ease with which crash protection and other safety technologies could be incorporated into the design and production of fuel efficient, attractive and reasonably priced small cars, the U.S. Department of Transportation in 1979 completed a congressionally mandated development activity called the Research Safety Vehicle program. It was carried out by the Department's funding, but by private sector contractors using privately developed technologies, including technologies developed by our very own auto industry.

I would now like to show you a brief piece of film that demonstrates some of the crash protection features that were made possible and made known in the RSV program. May we have the first piece? We will be looking here at one of the RSV's, the so-called minicar version, which was developed by a firm in California. I believe there will be testimony from a representative of that firm later today.

Here is the car—a fuel efficient, low-cost, very attractive, very handleable car that could be mass produced and sold for less than \$10,000 in 1980 dollars. Here is the kind of testing it was put through. We are looking now at a conventional small car on the left, here closeup in a frontal crash. As one sees, today's designs simply do not give the occupant any chance at all.

Here now is a close slow-motion look at the RSV on the right in a comparable head-on crash. We see the design of the body, the way that it handles energy and keeps it away from the passenger compartment, and that the airbags do a protective job.

Here, in a side impact, the design of the body, which uses fuel-injected foam in a lightweight shell—here another frontal impact. The airbags provide protection at speeds which simply are not available to today's new car buyers.

The Department followed up development of the RSV's with a vigorous program in 1979 and 1980 to alert the car-buying public that such injury reducing technologies existed and could be incorporated into future new cars designed at a reasonable cost. The Department also attempted to persuade car manufacturers to offer for sale at least some new cars with crash protection features along these lines.

To that end, the Department held numerous press conferences and public displays of the RSV. It contacted manufacturers here and abroad, conducted a wide range of crash tests and made RSV's widely available for inspection and exhibit.

Typical of the Department's efforts in 1979 to promote understanding of the RSV and its life-saving potential was the public service announcement which it circulated to television stations across the country.

This car is superior to our TV technology. Notice we have a slight jump in our tape, something we will have to live with.

Since then, the Department has apparently curtailed its efforts to publicize the RSV's. Both the cars themselves and the public television service announcements have disappeared from public view. The Administrator of the National Highway Traffic Safety Administration was quoted in the Los Angeles Times in September 1981 as stating that the RSV technologies "could not be reasonably employed in new cars."

In a recent television documentary, *Decade of Delay*, the Canadian Broadcasting Corp., examining the lag in getting safety to Canadians as well as Americans, and of course Canadians depend on what we decide down here in terms of their car safety, the CBC asked this question about the RSV: Why is the safest vehicle in the world hidden away here in an underground government garage when the cars we drive are so unsafe? Since the RSV was put in the basement and public service messages about it were discontinued, the principal means of informing the public that safer cars are possible has, for all practical purposes, evaporated.

One of the most important injury-reducing features of the RSV is its airbag system. Airbag development did not begin with the RSV program. It began and was completed earlier by private suppliers working with the support of General Motors and Ford. The excerpt from a film made in 1969, 4 years ago, by Eaton, Yale, and Towne,

then a contractor for airbag development, tells the story as of that time.

That future continues to a while off. General Motors also was moving forward on airbag development at that time through contractors with Allied Chemical Corp. By the early 1970's, GM had decided on its own initiative and apart from regulatory requirements to offer airbag systems in large volumes, first as optional, then as standard equipment on GM cars.

The company made public a firm timetable for introducing the airbag, including promotion and sale of approximately 1 million 1974 GM model cars. The automaker then said, "The airbag would be made standard equipment on all 1975 model GM passenger cars." To market the option, which is called the air cushion restraint system, GM made a short film planned for dealerships across the country.

Had GM actually marketed the film even half as aggressively as it markets stereo cassettes, vinyl roofs, and convenience packages comparable to what it says it would have to charge for airbags, it is hard to think that it could not have created a demand for airbags on the part of many car buyers.

Instead, GM failed to distribute its film to its dealers. It spent virtually none of its \$350 million annual budget on airbag marketing, and instead of marketing airbag-equipped cars during the 1974 to 1976 period it produced for sale only about 10,000 such cars. Meanwhile, Ford dropped its program after making fewer than 1,000 such cars for test purposes.

The predictable result was that GM sold what it made, about 10,000 airbag-equipped cars. According to a Wall Street Journal investigative article in December 1976, GM failed to push airbag sales. It gave the technology no promotion and instead, along with GM dealers, actually discouraged sales. I have attached a copy of that article.

The failure of car companies to provide safe cars so as to gain the competitive edge is not a new one. Senator Norris Cotton, the ranking minority member of the Senate Commerce Committee, during the hearings that led to adoption of the National Traffic and Motor Vehicle Safety Act of 1962, explained his reluctant decision in favor of regulating vehicle safety performance with this statement, and I quote. "One of the most discouraging pieces of testimony that the Committee heard was when an automobile company executive testified that safety could not be sold to the public—that you could sell speed, you could sell power, you could sell style, but you could not sell safety."

"In the first place," Senator Cotton continued, "I do not agree with that and I hope that will not prove to be the case. I cannot imagine a more favorable situation than to have keen competition between the automobile manufacturers in the field of safety, to have them advertise their brands of safety and to have them vie with each other."

The reluctance of American car companies to sell safety may be softening somewhat. General Motors recently ran a national series of print and media advertisements based on information from the Highway Loss Data Institute, an affiliate of our Institute. The ad

showed General Motors cars doing better than many of their competitors' cars in terms of frequency of insurance claims for injury.

In addition, GM Vice Chairman Kehrl, despite separately stated doubts of his about airbags, stated recently that he does not believe that safety does not sell and feels instead that America's new car buyers are giving increased priority to safety in their purchasing decisions.

Mr. Chairman, the remainder of my testimony deals with the failure for regulatory rather than marketplace reasons up to now for the public to be able to take advantage of a windshield design that very substantially reduces injuries, lacerating injuries in car crashes. I understand that a witness who is representing the company that makes that windshield will be appearing shortly.

Therefore, I will simply submit that testimony to the record and point out that this concept, one which the Insurance Institute for Highway Safety has looked at for a long time, represents a very important step forward in injury reduction. It is one that your subcommittee has looked at before and I will simply refresh all of our memories and let us take a brief look by showing you a final film clip that demonstrates what that windshield does, if we may have that last film clip, please.

In conclusion, airbags and anti-lacerative windshields are among designs for crash protection developed years ago that could be saving thousands of lives today and preventing tens of thousands of crippling and scarring injuries in America every year in car crashes. But they are not. That is one of the greatest public health tragedies facing this country.

Mr. Chairman, we have some cars with us today which I believe are on the C Street side of this building that demonstrate how these technologies work in crashes. It is my understanding that we will look at those at the conclusion of today's hearing and I will be happy to make those available at that time.

Senator DANFORTH. Thank you, Mr. Kelley. I appreciate that. I would very much like to see the cars, and when we conclude the list of witnesses I want to go out and look at them, as I am sure other people do. I appreciate the care and the time that you spent in preparing this very impressive testimony.

Mr. KELLEY. Thank you.

Senator DANFORTH. Is there any way to estimate the savings of life and injury had some or all of these new safety technologies been installed in automobiles?

Mr. KELLEY. Well, there are certainly estimates available and they are probably conservative. It has been estimated by the Department of Transportation, which I believe continues to subscribe to this estimate, that were front-seat airbags, full front-seat airbag protection available in all cars on the highways today, we would be experiencing 9,000 fewer deaths each year than we are.

That comes to about one-third of all occupant deaths because the total figure of 48,000 to 50,000 deaths includes pedestrians and cyclists. Occupant deaths ranges around 30,000, so the 9,000 becomes impressive indeed.

We know from our own studies and from Government studies that impacts with glass in cars are accounting for some 300,000 serious lacerations or fractures in car crashes each year. How many

of those lacerations would be eliminated or substantially reduced by the availability of the windshield that we have just looked at is difficult to estimate, but one must conclude—and I believe the Department itself has concluded—that the reduction would be very substantial indeed.

As you will see as we look at the cars outside, one of those cars is part of a demonstration fleet being operated by the Maryland State Police, a fleet of Fords equipped under a joint IIHS-Ford-Maryland Police project with that windshield. You will see the mark of the head and the shattered windshield, and yet you can run your hand across the inside of that windshield and it is as if nothing has ever struck it.

So these remarkable technologies would be having a profound impact on the economic burden, on the terrible burden of grief not just to the sufferers but to the survivors and their families, and on the hospital bed days and all this other tragic waste that is needlessly happening.

Senator DANFORTH. What are the reasons, in your judgment, whether you agree with them or not, for not incorporating them in automobiles?

Mr. KELLEY. I think that the failure of the auto companies to do this on their own initiative, something that saddens me very greatly, is due to a combination—and this is purely my own opinion—is due to a combination of considerations. First of all, I think that the companies, at least the domestic U.S. companies, are somewhat trapped by their own shibboleths of the past.

They have said so often that it is not the car, it is the driver; they have said so often that safety does not sell, even though that has been disproved in the marketplace on the few occasions that safety has been offered, that I think it is very hard for them to get out of that historical mindset and break into the new view that is represented, I must say very cheerfully, by Mr. Kehrl's more recent statement.

I would think there is a belief—an erroneous one, to my mind—that to talk about car crashes in advertising is poor form—you cannot sell an airbag unless you talk about a car crash. You really cannot sell an airbag unless you tell people that there is some chance that that car is going to be in a collision and that they will be hurt without this production.

To talk about a car crash I think is regarded as poor form, bad taste, negative image. The companies think it does not sell fast, sexy, stylish cars. So I think that has been one of the considerations.

I find the economic arguments, frankly, very, very hard to believe—the notion that because airbags might cost hundreds of dollars people will not buy them. People now are paying unbelievable amounts of money for options that the car companies have chosen to put on.

I was looking down an options list the other day and I saw locking wire wheels at \$850, and a total convenience package at \$1,100. I do not know quite what was in it that was so convenient, but you can look at any options list of an American manufactured car and see figures that range from \$500 to \$1,000 for things that might be

pleasant to have but are trivial or totally unessential from a health protection standpoint.

As cars grow smaller, as the public becomes increasingly aware that there is less around them in that structure to protect them, I believe that the marketplace and public opinion polls we have cited here certainly substantiate that there is a market that will demand that the companies do that.

Mercedes Benz has announced it will be making airbags available in this country and that is certainly very progressive and forward-looking, and I hope that it will begin a recognition by other companies that there is money to be made and lives to be saved out there.

Senator DANFORTH. You know, if the manufacturers do not think it is good business to advertise safety, as you pointed out in your presentation, the Department of Transportation has done that, has it not?

Mr. KELLEY. The Department of Transportation was for a time giving very, very vigorous attention to publicizing motor vehicle safety features and technologies through the RSV program. I do not sense that that is happening now.

Senator DANFORTH. What was the reason for doing that? Do you know why the Government should run commercials which publicize various safety features?

Mr. KELLEY. Well, I think the rationale—and I believe it springs in part from the legislative history in the 1966 act—was that experimental research cars were to be developed to, No. 1, show the public what could be done and plant the seeds for public demand and, No. 2, to set some standards—I do not mean in the regulatory sense—but standards of excellence and provide some incentive and, if necessary, some free technological guidance to the car company.

Now the public service announcement we just saw was, of course, not paid television time. It was distributed by the Government and paid for in stations as a free kind of public service along the lines of charity.

Senator DANFORTH. Did the stations show it?

Mr. KELLEY. Yes. It got tremendous use. I believe, but I am not sure, it was subsequently withdrawn by the Department of Transportation, but I cannot say that officially because I have not seen any document that does that. I just know that it suddenly disappeared from the airwaves.

Senator DANFORTH. But the stations were willing to show it?

Mr. KELLEY. The stations were very interested in showing it.

Senator DANFORTH. The reason for showing that, of course, is that if the auto manufacturers do not want to advertise safety, then somebody should be advertising.

Mr. KELLEY. Well, that is correct.

Senator DANFORTH. Do you know when the showing of this commercial was terminated?

Mr. KELLEY. My sense of the dropping of publicity for the RSV program by the Department was that it happened in mid-1981, but I have no definite date.

Senator DANFORTH. You do not know any reason why it should be dropped?

Mr. KELLEY. No, none at all. Indeed, I think that if one is to argue, and it is certainly a worthwhile argument to consider, if one is to argue that the marketplace should take over the job of providing better safety to Americans on an optional basis that they are willing to buy rather than that the regulatory apparatus should be relied on to do that, there is even more need to get that information out to the public.

Senator DANFORTH. The auto manufacturers contend that if people would just use their seat belts they would be much safer than using passive restraints and airbags. Therefore, they want to advertise the use of seat belts. They feel that is a good use of advertising.

How would you respond to that? Is it true that using seat belts is safer than using airbags?

Mr. KELLEY. Well, if I may approach that historically, Mr. Chairman, first of all, it is very well demonstrated and has been demonstrated over and over again and well researched that programs to persuade, cajole, exort, educate, whatever the word, promote the public into wearing seat belts just do not have an effect in this country.

It has also been well demonstrated up to now that despite very vigorous efforts by safety activists and auto companies and others, States will not pass laws to mandate safety belt use. The safety belt use levels continue, as I say in my testimony, to stay around 10 percent.

As to the comparability of safety belt and airbag protection, I do not know of any self-respecting automobile engineer who would make the statement that safety belts are the safest restraint system, even when worn. By far the safest restraint system is the airbag, in combination, when people will wear it, with the lap belt to provide subsidiary, secondary protection in rollovers.

The airbags do provide, in the few cars that have it, protection at much higher speeds than those at which belts are capable of preventing injury. Comparable tests by GM and others make this abundantly clear. These are not either/ors. The airbag is the next important quantum leap forward in protecting people in crashes.

Senator DANFORTH. Thank you very much, Mr. Kelley.

Mr. KELLEY. You are very welcome.

[The statement follows:]

STATEMENT OF BEN KELLEY, SENIOR VICE PRESIDENT, INSURANCE INSTITUTE FOR
HIGHWAY SAFETY

Mr. Chairman, at your invitation I am appearing today to discuss existing automotive technologies for reducing or eliminating occupant injuries in motor vehicle crashes, and the availability — or lack thereof — of such injury-reducing technologies to the motoring public. The Insurance Institute for Highway Safety, of which I am a senior vice president, is an independent, nonprofit, public service organization dedicated to reducing the losses — deaths, injuries, and property damage — resulting from crashes on the nation's highways. Supported directly or indirectly by companies writing most of the motor vehicle insurance in the United States, the Institute conducts research involving a wide range of pre-crash, crash, and post-crash factors that contribute to the huge losses resulting from highway crashes.

Each year, crash injuries kill thousands of people and damage the brains and spinal cords of many thousands more. Millions of people are injured less severely, and the economic toll of all this mayhem is in the billions of dollars (1,2). The detailed figures are well known to this subcommittee. They describe, in sum, one of the worst public health problems in America.

If technological approaches exist to substantially reduce this carnage and economic waste — which they do, and have for years — it defies sound health policy and good economic sense (not to speak of compassion for the sufferers of crash injuries and their loved ones) that those technologies still are unavailable to the car-buying public, even as options. Yet that is the case today, whether because of marketplace malfunctioning, regulatory incompetence, or both.

The fact is that, from a safety standpoint, all but a handful of the tens of millions of new cars offered for sale to the American public during the past decade were obsolete the moment they rolled off the assembly line. The same is true of every car being sold in this country today, in spite of clear, continuing evidence that Americans want safer cars and are willing to pay the additional cost, if any, they involve. (Attachment 1 summarizes the findings of more than 20 public opinion polls concerning occupant crash protection.)

The importance of injury-reduction technologies can best be understood in the context of the automobile as a crash package — a moving container holding precious human cargo. In a violent impact, the likelihood of damage to that cargo will increase or decrease *depending on how the package was designed in the first place*. Properly designed, the package will minimize the likelihood that the people inside will be injured.

- First, it will reduce the chance of occupant compartment intrusion. Strengthened occupant compartments, better resistance to side impacts, and generally improved energy absorption by the structure surrounding the occupant compartment are essential, technologically possible and, in the marketplace, generally unavailable.
- Second, it will reduce the chance of occupants being thrown into hostile interior structures. Ways to automatically restrain occupants in frontal crashes — the deadliest kind — from contacting hostile interior structures in all but the most violent crashes have been known for years. Yet here again, the motoring public generally is unable to buy these technologies on new cars.

Meanwhile, according to the Department of Transportation, belt use in America is just over 10 percent (3), and small, inherently less crashworthy cars are increasing in number on the highways (4). In large part because of the role of the small car as presently designed, the Department expects crash deaths to reach 70,000 a year by 1990 (5). The technologies to counteract many of these deaths and injuries have been in existence for years, as a result of both industry and government developmental efforts. But tragically, the public still cannot buy them.

To demonstrate the ease with which crash protection and other safety technologies could be incorporated into the design and production of fuel-efficient, attractive, and reasonably priced small cars, the U.S. Department of Transportation completed in 1979 a Congressionally mandated development activity called the "Research Safety Vehicle" (RSV) program (6). More accurately, the program was carried out with the Department's funds by private-sector contractors using privately developed technologies. Prototype RSV cars were developed in the program — one by an independent research group, Minicars, which produced a group of safe, efficient cars designed from the ground up, and the other by Calspan, working in conjunction with Chrysler and Simca to fashion such cars on the basis of an existing Simca design.

The following film clip highlights the sorts of crash protection features for small cars that the RSV project identified — features that still are not available in the U.S. or Canadian marketplaces.

FILM CLIP NO. 1, RESEARCH SAFETY VEHICLE
CRASH TESTS, FRONT AND SIDE (7)

The Department followed up development of the RSVs with a vigorous program, in 1979 and 1980, to alert the car-buying public that such injury-reducing technologies existed and, through regulatory requirement or public demand in the marketplace, could be incorporated into future new-car designs at reasonable cost. The Department also attempted to persuade car manufacturers to offer for sale at least some new cars with crash-protection performance levels approaching those of the RSV. To those ends, the Department held numerous press conferences and public displays to bring attention to the cars. It conducted crash and handling tests of RSVs for car manufacturers here and abroad, and it made prototype RSVs widely available for inspection and exhibit by interested organizations in the private sector. Typical of efforts to let the public know about RSVs and their life-saving potential was this public service television message distributed by the Department in 1979.

FILM NO. 2, RESEARCH SAFETY VEHICLE PUBLIC SERVICE ANNOUNCEMENT, NARRATED BY LORNE GREENE: Introducing the revolutionary new RSV, the car of tomorrow, today. Designed for beauty and economy with outstanding gas mileage and a no-nonsense price tag. But, what makes the RSV totally unique is its safety. Watch it bounce back from a wall with no damage. Now a 50 miles-an-hour crash. In a crash like that its air bags will save your life. The RSV has been attacked, crashed, smashed, and rolled. In each test, the driver and passengers would have walked away. The RSV — stylish, easy to handle, economical, and absolutely the safest automobile ever created. But there's one slight catch: you can't buy it. Someday soon a car like the RSV could be a reality. To find out how, call 800-424-9393, anytime (8).

Within a few months of its first appearance on television, that message reportedly had stimulated more than 10,000 people to call for more information about the RSV.

By mid-1980, the Department had completed an investigation to determine how consumers would feel about RSV-type cars and safety features once they were informed about them — in other words, to determine whether, by continuing to tell the public about the RSV, a climate could be created for increased demand in the marketplace for crash-protective cars. The results were encouraging. Once informed about RSVs and shown films of their performance capabilities, some 25 percent of the interviewed panelists expressed a "sincere interest in buying the RSV if it were on the market in the next 30 days" (9). Most of those respondents were young married adults with children.

Not long after this, however, the Department apparently curtailed its efforts to publicize RSVs. Both the cars and the public service television announcements disappeared from public view. The administrator of the National Highway Traffic Safety Administration was quoted in the *Los Angeles Times* as stating that the RSV's technologies "could not reasonably be employed" in new cars (10). In its recent television documentary, "Decade of Delay," the Canadian Broadcasting Corporation asked this question about the RSV: "Why is the safest vehicle in the world hidden away here [in an underground government garage] when the cars we drive are so unsafe?" (11). Since the RSV was put in the basement and public service messages about it were discontinued, a principal means of informing the public that safer cars are possible has for all practical purposes evaporated.

One of the most important injury-reducing features of the RSV is its air bag system. Air bag development, of course, did not begin with the RSV program; it began and was completed years earlier, by private suppliers working with the support of General Motors and Ford (12). The following excerpt from a film made in 1969 by Eaton, Yale, and Towne, then a Ford contractor for air bag development, tells the story as of 14 years ago.

FILM CLIP NO. 3, FROM "PEOPLE SAVER": With more than 60 years experience supplying the automotive industry, Eaton, Yale, and Towne, a diversified multinational company headquartered in Erieview Tower, Cleveland, Ohio, has now come up with a revolutionary new crash restraint system, "autoceptor." Twenty miles an hour, simulating the action with parents and an unrestrained child. Thirty miles an hour at 30 degrees. Slow motion reveals the occupants were thoroughly protected. Throughout most of autoceptor's development, Eaton, Yale, and Towne worked closely with Ford, General Motors, Chrysler, and American Motors, as well as many foreign car manufacturers. Over two million miles of testing subjected autoceptor to repeated series of jolts and vibrations. Autoceptor will deploy only after a frontal collision, and then only at speeds above eight miles an hour. A minor fender-bender will not set it off. In the future, it will be applied to non-frontal collisions, trucks, and buses (13).

General Motors also was moving forward on air bag development, through contracts with Allied Chemical. By the early 1970's, GM had decided, on its own initiative and apart from prospective regulatory requirements, to offer air bag systems in large volumes, first as optional and then as standard equipment. GM made public a firm timetable for introducing the air bag, including promotion and sale of "approximately one million 1974 model General Motors cars." The automaker then said the air bag "would be made standard equipment on all 1975 model General Motors passenger cars" (14). To market the air bag option, which it called the "air cushion restraint system," GM made a short film planned for showing at dealerships across the country. Here is an excerpt of that film made for Buick dealers.

FILM CLIP NO. 4, FROM "BUICK PRESENTS THE AIR CUSHION RESTRAINT SYSTEM": The GM air cushion restraint system [ACRS] senses that a frontal crash is occurring and activates the restraints. To accomplish this, the system uses a bumper impulse detector. A second crash sensing system is mounted beneath the instrument panel. A third detector is activated in more severe frontal crashes. The passenger air cushion inflates and extends from the steering wheel to the right door. The entire sequence of a 30 mile-per-hour barrier crash is completed in about 1/8 of a second, from instant of contact through car rebound from the barrier. The in-car switches respond to direct frontal impacts and angular frontal impacts, left or right of the car's direction of travel, but are not affected by simple side or rear-end impacts. The parts and the system have been evaluated in thousands of the pre-production tests. Various car collisions were staged, and over 100 human volunteers tested the system. Naturally, years of research and testing have gone into the development of the air cushion restraint. The Southwest Research Institute in San Antonio ran tests using volunteers under controlled conditions. We asked them to find out how people would react if there were an inadvertent firing. The driver is a middle-aged woman. She knows that we can trigger the ACRS, but she doesn't know when: what did you think of the sound ... did the noise bother you ... startled me, yes ... were you able to maintain control of the car at all times ... no problem at all; it was just a moment, and then you could put the bag right down and see. Even when your passenger is just a tot, the belt, the love seat, and the ACRS provide security. The ACRS offers freedom and comfort to owners and passengers, and meets all federal requirements for occupant protection (15).

Had GM actually promoted that film — had it marketed the crash-protection benefits of its air bags even half as aggressively as it markets stereo cassette decks, vinyl roofs, and "convenience packages" — it is hard to think that it could not have created a demand for air bags on the part of many car buyers. But instead, GM failed to distribute the film to its dealers. It spent virtually none of its \$350 million annual advertising budget on air bag marketing. And instead of manufacturing millions of air bag-equipped cars during the 1974-1976 period, it produced for sale only about 10,000 such cars. Meanwhile, Ford dropped its program after making fewer than 1,000 air bag-equipped cars for testing purposes.

The predictable result was that GM sold what it made — about 10,000 air bag-equipped cars. GM claimed that consumers didn't want air bags (a claim it continues to make even while its engineers praise the reliability and effectiveness of air bag restraint protection). According to a *Wall Street Journal* investigative article in November 1976, GM "failed to push" air bag sales, gave the technology "no wholehearted promotion," and instead, along with its dealers, "actively discouraged sales." (Attachment 2 is a chronicle of GM's failure to provide air bag technology to the public. Attachment 3 is the *Wall Street Journal* article.)

One of those interviewed by the Department of Transportation during its study to determine possible consumer interest in RSV-type cars said this:

... until now, car manufacturers haven't been building cars to be safe and advertising it. So consumers are naive about auto safety compared to fuel economy, styling and comfort. Once safety is introduced and consumers get involved, then the marketplace will dictate the level of safety consumers want (16).

That observation is not a new one, nor is the failure of car companies to provide safer cars so as to gain a competitive edge. Senator Norris Cotton (R-N.H.), ranking minority

member of the Senate Commerce Committee during hearings that led to adoption of the National Traffic and Motor Vehicle Safety Act of 1966, explained his reluctant decision in favor of regulating vehicle safety performance with this statement:

... one of the most discouraging pieces of testimony that the committee heard was when an automobile company executive testified that safety could not be sold to the public; that you could sell speed; that you could sell power; that you could sell style, but that you could not sell safety.

In the first place, I do not agree with that and I hope that will not prove to be the case I cannot imagine a more favorable situation than to have keen competition between the automobile manufacturers in the field of safety, to have them advertise their brands of safety, and to have them vie with each other (17).

Little has changed since then. In an interview on the Canadian Broadcasting Corporation's television show aired last month, GM Vice Chairman Howard KehrI agreed that if air bags were standard equipment there would be protection in frontal crashes for 100 percent of the people — people now unprotected because they do not wear their belts. But, KehrI added, "the other side of it is that the cost of the air bag, the initial cost, is very high. And the replacement cost is very high, \$1,000 or somewhere in there. You get into the question, can people afford that?" (18).

Air bag suppliers have said that \$1,000 is a drastically inflated figure based on unrealistically low production volumes (19). But even if it were an accurate price estimate for a full front-seat air bag system, there is a strong possibility that many people would be willing and indeed eager to pay such a cost for automatic protection against death, crippling, or other injuries in frontal crashes. Mercedes-Benz seems to think so. It will charge more than \$800 for an optional driver-side air bag on future new cars it sells in America (20). (For several years, Mercedes has successfully been offering air bags at comparable prices in Europe (21).)

GM itself has chosen to market and sell much less essential options at similar prices. Air conditioning in a 1983 Buick Century lists at \$725; special bucket seats list at \$600. In an Electra, a CB-cassette-radio lists at more than \$750, and "Park Avenue" interior trim lists at \$525. The Camaro's removable roof panels cost \$825. And in a Cadillac, the astroroof costs \$915 (22). These items are listed as options, but as car buyers know, it is often difficult to find a car on a dealer's lot that does not have such expensive, added "options" already in place. In the meantime, safety-related options such as air bags still are nowhere to be found in the new-car showroom.

The reluctance of American car companies to sell safety may be softening somewhat. General Motors recently ran a national series of print and media advertisements based on information from the Highway Loss Data Institute, an affiliate of the Insurance Institute for Highway Safety. The ads showed General Motors cars doing better than many of their competitors' cars in terms of the frequency of insurance claims for injuries (23). In addition, GM Vice Chairman KehrI, despite his separately stated doubts about consumer interest in air bags, said he does not believe "safety doesn't sell" cars, and feels instead that America's new-car buyers are giving "increased priority" to safety in their purchase decisions (24).

Encouraging as those signs of change may be, they still have not brought to America's new-car marketplace the levels of crash protection design and performance that were developed years ago. Mercedes' announcement that it will offer optional air bags on cars sold in this country represents an exception, albeit limited in scope and volume, to that sad truth.

It is not only marketplace failure that is denying Americans the right to buy better car crash protection. For example, an important feature of the Department of Transportation's RSV program, along with the air bag systems it employed, was the use in the Calspan car of what the Department and its contractor described as the safest windshield design in the world. Unlike the windshields now found on virtually all cars in this country, the RSV's windshield very substantially decreases the likelihood of a face being lacerated in a face-to-windshield impact. The following film clip explains this technology.

FILM CLIP NO. 5, FROM "FACES IN CRASHES": All cars currently sold in America are required to be equipped with laminated windshields, in which a sheet of plastic is sandwiched between outer and inner layers of glass. In a crash, the glass adheres to the plastic, meaning less likelihood of a jagged hole with edges that can slash faces and necks. But the current designs still allow faces to contact glass, resulting in extensive facial lacerations for adults and children in frontal collisions. A French windshield design, now available on some cars in Europe, handles the problem by adding an inner layer of plastic, which acts as a protective barrier in facial impacts. Since there is little or no facial contact with broken glass even in higher-speed impacts, the possibility of lacerating injuries is substantially reduced (25).

Again, like the air bag, the anti-lacerative windshield has been fully developed for years. In 1981, the Department of Transportation noted the "significant potential benefits" of windshields such as the one made by Saint-Gobain Vitrage, a French company (26). And the Insurance Institute for Highway Safety has found that this technology could help to reduce substantially the 625,000 hospital-treated facial injuries that occur every year in the United States in motor vehicles (27). Many Europeans already are benefiting from the new windshield technology.

Nonetheless, Americans cannot buy the anti-lacerative windshield on any car in the U.S. marketplace, because of technicalities in the existing federal standard governing laminated windshields (FMVSS 205). The Department of Transportation until recently has refused to take steps that could lead to either expedited deregulation or, although more cumbersome, the issuance of new regulations whose result would be to enable access for all car makers and car buyers to the established technology of windshield designs that reduce the frequency and severity of lacerations to faces in crashes (28). Only recently, the Department took a small, belated forward step by permitting General Motors to equip about 2,500 fleet cars with anti-lacerative windshields for demonstration purposes. And today, the Department reportedly will issue, at long last, a notice of proposed rulemaking that will result in a standard permitting this important injury-reducing technology to be made available to Americans sometime in the future.

Air bags, anti-lacerative windshields, injury-reducing designs for side impact crashes, ejection-resistant door locks — these technologies, developed years ago, could be saving thousands of lives and preventing tens of thousands of crippling injuries in America every year. But they are not, and that is one of the greatest public health tragedies facing this country today.

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ATTACHMENT 1

Insurance Institute for Highway Safety
Research Note No. 102 July 1982

Public Opinion Surveys on Occupant Crash Protection

Adrian K. Lund and Allan F. Williams

From time to time, researchers on the staff of or supported by the Insurance Institute for Highway Safety develop analyses, findings, and observations that require publication in formats and on schedules more flexible and timely than those provided in journals. *Research Notes* is a vehicle provided by the Institute to make such material available on a timely basis. For more information concerning *Research Notes* or other Institute publications, write to Communications Department, Insurance Institute for Highway Safety, Watergate 600, Washington, DC 20037.

The Insurance Institute for Highway Safety is an independent, nonprofit, scientific and educational organization. It is dedicated to reducing the losses — deaths, injuries, and property damage — resulting from crashes on the nation's highways. The Institute is supported by the American Insurance Highway Safety Association, the American Insurers Highway Safety Alliance, the National Association of Independent Insurers Safety Association and several individual insurance companies.

Public Opinion Surveys on Occupant Crash Protection

In the United States during the last decade, more than 20 public opinion polls have included questions on occupant crash protection. Findings from these polls include the following:

- **All-Industry Research Advisory Council, 1981:** In a national survey of adults aged 18 years and older, 63 percent rated as "very important" the degree to which a car protects people from injury, trailing only price, mileage, and operating cost as the prime concerns in choosing a new car. Twenty-five percent rated type of restraint as very important. Fifty-one percent thought about the right safety features were already provided on new cars, and 39 percent believed more were needed (1).
- **Tarrance and Associates, 1981:** In a national telephone survey of U.S. adults, most respondents reported not wearing seat belts. Most thought belts should be worn, and 58 percent said they were not unreceptive to increasing their use of belts. When asked why people do not wear belts, the three reasons volunteered most frequently were inconvenience, forgetfulness, and discomfort.

Entrapment and danger of belt use were mentioned as reasons for nonuse of belts by only seven percent and one percent, respectively. However, when entrapment was specifically suggested to respondents as a reason people give for not wearing belts, 48 percent agreed that it was a "very important reason." Thus, although few respondents seemed to fear being entrapped themselves, many apparently believed that people who do have such a fear would not use seat belts (2).

- **National Analysts, 1981:** Personal interviews with a national sample of new-car owners or prospective car buyers found that 90 percent were "somewhat" (39 percent) or "very" (51 percent) interested in the crash-worthiness ratings of new cars. When respondents were asked to choose one from a set of 32 hypothetical new cars, described in terms of 10 characteristics, car make was the characteristic that influenced choice the most, followed by price and gas mileage. Crashworthiness, damageability, maintainability, and car size characteristics ranked next and were about one-third as influential as make. Finally, styling, ride, and acceleration characteristics had the least influence (only about one-sixth that of make).

Seventy-eight percent liked "the idea of government ratings of things, like safety and maintenance costs," with 35 percent willing to add an extra \$20 to a car's price tag to pay for tests. The most frequently preferred location of ratings results was the new car's window sticker (25 percent of respondents) (3).

- **Opinion Research Corporation, 1981:** In a national telephone survey, only 12 percent of Chevette owners and 23 percent of Rabbit owners reported they bought automatic belts because they liked them, with 37 percent and 25 percent, respectively, unaware that they had ordered cars with automatic belts. However, acceptance of the belts was high, with 74 percent of VW owners and 44 percent of Chevette owners saying they would prefer automatic belts over the manual type. Reported belt use on last drive was 89 percent for Rabbit automatics, 70 percent for Chevette automatics, 48 percent for Rabbit manuals, and 31 percent for Chevette manuals (4).
- **The Prism Corporation, 1980:** Twenty-three "focus groups" discussed attitudes and opinions about safety and the Minicars Research Safety Vehicle (RSV). Considerations such as price and fuel economy dominated car buying discussions, but safety became a concern when new protective features were presented. Given information on the RSV program and data on auto crashes and injuries, most panelists said they would be willing to pay between \$300 and \$1,500 for a "safety package" of features on a new car. Twenty-six percent were interested in buying the RSV if it were on the market in the next 30 days (5).
- **New York Times, 1980:** In a national survey, consumers were asked, "Would you favor or oppose requiring car manufacturers to equip all new cars with air safety bags?" Nearly half (45 percent) said they were in favor, while 32 percent were opposed. Drivers under 35 years old voted 63 percent in favor to 21 percent opposed. In contrast, 93 percent of the retail automobile dealers sampled opposed air bag requirements. Only 19 percent of consumers and 16 percent of dealers favored a \$25 fine for not wearing seat belts; 73 percent and 81 percent, respectively, opposed such a fine (6).

- **Area Market Research Associates, 1979:** A telephone survey of Arkansas motorists aged 16 and older indicated that a very large majority were aware of air bags and how they work. Nearly three-fourths favored requiring air bags in new cars. Women were more likely than men to favor mandatory air bags (82 vs. 62 percent). Another three-fourths said they seldom or never used safety belts, the most frequently reported reasons for nonuse being forgetfulness/laziness, discomfort, "too much bother," and inconvenience. About 54 percent favored belt-use laws and 86 percent favored a helmet-use law. By a margin of 59 percent to 48 percent, women were more likely than men to favor seat belt laws. Data were not provided on support for motorcycle helmet use laws in relation to the respondents' sex.

Almost all respondents with children aged 1-5 years old reported ownership of child restraint systems, but only 35 percent said they used them "always." About 68 percent favored retention of the 55 mph speed limit, with 29 percent giving safety as a reason. Another 13 percent gave safety and gas as reasons (7).

- **House Government Activities and Transportation Subcommittee, 1979** (reporting results of General Motors' 1979, 1978 and 1971 surveys): A summary of the General Motors 1979 survey indicated that among "200 owners of large size GM cars," 70 percent preferred air bags to three different systems of automatic belts, "even though the air bag was priced over \$350 and the next most expensive automatic belt system was less than half that amount." Passive restraints were preferred four to one over a mandatory seat belt law, and 85 percent said they would buy a full-size car with passive restraints.

A summary of the 1978 GM survey indicated that "over a thousand" GM car owners or intended buyers were "afforded the opportunity ... to experience the various systems [active belts, passive belts, air bags] as they would in their own cars Passive restraint systems ... were preferred by a margin of two to one over a mandatory seat belt law About 50 percent of the total sample preferred the air cushion even though it was said to cost over \$300, while the next preferred automatic belt would cost less than half that amount and another automatic seat belt would cost less than one-quarter the price of the air bag."

A summary of GM's 1971 survey of 630 people not employed by the auto industry who participated in a Chicago workshop stated that, after exposure to various films, hypothetical news stories, and prices, 75 percent preferred passive restraints to active ones, with 50 percent preferring air bags. Only five percent wanted no restraints and 20 percent wanted current, active belts. When asked to choose between passive belts and air bags, 56 percent chose air bags, and 41 percent said they would buy a different make of car to get them (8).

- **Teknekron, Inc., 1979:** A national telephone survey of drivers found that only 24 percent reported using belts always or almost always (50 percent reported never using them), although 42 percent thought the belt was very likely to protect them. Only eight percent said the belt was very likely to cause an injury. Mandatory belt use laws were favored by 52 percent, and automatic belts were seen as a "great idea" by 38 percent, while 32 percent said they would disconnect them. Respondents favored air bags over automatic belts, 51 percent to 40 percent, even when air bags were said to cost \$100-\$200 more than belts. The 55 mph speed limit was favored by 77 percent (9).
- **Virginia Highway and Transportation Research Council, 1979** (reporting results of a 1978 poll): In a state-wide telephone survey of Virginia residents over the age of 16, 90 percent felt driver education should be required for licensing of drivers under 18 years old; 74 percent favored the 55 mph speed limit; 32 percent believed speed limiting devices should be required on cars; 86 percent approved of semi-annual safety inspections; 76 percent of cyclists and 94 percent of non-cyclists supported the state's helmet law; 33 percent favored mandatory seat belt use; 55 percent favored passive restraint requirements, and 56 percent said they would install air bags or automatic belts in their next car at a cost of \$200. Forty-two percent felt there was no improvement needed in the state's highways (10).
- **ABC News-Louis Harris Survey, 1979:** In a national, face-to-face survey of adults, 51 percent said the federal government was moving too slowly in efforts to make automobiles safer, while only nine percent felt the pace was too fast (11).

- **Teknekron, Inc., 1978:** A national telephone survey of drivers found that 54 percent favored mandatory belt use legislation. However, less than 25 percent reported always or almost always using belts, and 73 percent supported the passive restraint requirement. (Support was greater among younger drivers.) The 55 mph speed limit was favored by 76 percent (12).
- **P.D. Hart and Associates, 1978:** Personal, home interviews with a national sample of adults indicated more concern about injury from automobile crashes than other "accidents." Forty-seven percent felt cars were designed with crash protection in mind, while 38 percent felt the opposite; 65 percent agreed that cars should have as many safety features as possible as standard equipment, while only 26 percent agreed that safety features should be optional. "Safety and safety features" were perceived as of major importance in car buying decisions by 72 percent (76 percent of the women and 68 percent of the men surveyed). These features ranked in importance below cost, gas mileage and repair record, but above insurance rates, comfort, styling, size, dealer service, and make.

Twenty-one percent believed "the chances of getting into an accident are so small that seat belts aren't really worth the inconvenience." Thirty-seven percent said "there's nothing that would make me use seat belts most of the time." Only 16 percent claimed to use belts "almost all the time." Only 25 percent thought the government should encourage belt use, while 48 percent thought the government should require automatic crash protection. Eight percent thought government should do both, 10 percent neither. Fifty-eight percent moderately or strongly favored passive restraint rules, while only 25 percent moderately or strongly opposed them. If air bags cost \$350 more than automatic belts, 35 percent would prefer air bag-equipped cars to cars with belts. If bags cost \$200 more than belts, 38 percent would prefer air bag-equipped cars. If \$100 more, 44 percent would prefer the air bags (13).

- **Volvo of America, 1978:** Initial attitudes toward passive restraints in focus groups of American men and women ranged from pro-air bag to pro-automatic belt to anti-any passive restraint device, with all attitudes based on relatively little "real knowledge." After these groups saw two films describing both air bags and automatic belts, air bags became a "highly desirable commodity to at least half of the participants in each group There were even those who had been extremely opposed to air bags who, after seeing the two films, felt that 'air bags look like a real good thing to have in your car I think they would really matter in a bad accident'" (emphasis in original). Additionally, air bags were overwhelmingly favored over automatic belts, even though groups were told that air bags would cost "at least several hundred dollars, as compared to under \$100". This preference seemed to be based on safety, mechanical reliability, and aesthetics (14).
- **University of North Carolina Highway Safety Research Center, 1978:** A survey of owners of GM air bag-equipped cars gave positive, unsolicited comments about air bags. Several respondents said they would want to buy air bags in their next car. In other comments, respondents reported that some mechanics were hesitant to work on the cars and that some dealerships had attempted to discourage the purchase of air bag-equipped cars — e.g., "I might add that I was *discouraged* by 3 different Buick dealers from purchasing the air bag" (emphasis in original) (15).
- **Market Opinion Research, 1978:** In a random telephone survey of Michigan drivers aged 16 and older, 80 percent favored mandatory helmet use for motorcyclists (16 percent were opposed). There was less support for mandatory restraint use in automobiles, with 54 percent favoring a restraint law for children under four years old (36 percent opposed), 35 percent supporting a restraint use law for children and teenagers under 18 years old (56 percent opposed), and 39 percent supporting a universal mandatory restraint use law (56 percent opposed).

When the same questions were asked of a random sample of motorcyclists with listed telephone numbers, 53 percent of the cyclists favored mandatory helmet use (45 percent opposed), 37 percent favored mandatory restraint use for children under four years old (54 percent opposed), 14 percent favored mandatory restraints for children and teenagers (82 percent opposed), and 16 percent favored universal mandatory restraint use (80 percent opposed) (16).

- **Virginia Highway and Transportation Council, 1978** (reporting results of a 1977 poll): In a statewide telephone survey of Virginia residents older than 16 years, 90 percent favored right-turn-on-red; 79 percent approved of the 55 mph speed limit (although 68 percent favored raising the limit to 60 mph on interstates); 90 percent favored driver education for drivers under 18 years old; 38 percent favored mandatory belt use; 50 percent approved of mandatory passive restraints; 62 percent would buy air bags as an option at \$200 or less, and 85 percent approved of semi-annual auto inspections. Ninety-two percent of non-cyclists (81 percent of cyclists) approved of helmet use laws (17).
- **L.S. Robertson, 1977**: In a national telephone survey of prospective buyers of new cars, respondents indicated a preference for more automatic crash protection (39 percent) rather than for protection that must be activated (15 percent); 38 percent chose "both types of protection." Respondents were willing to add an average of \$12 to their monthly car payments, if the added cost would save 6,000 lives a year; that amount increased to about \$17 and \$20 to save 12,000 and 18,000 lives, respectively (18).
- **Gallup Poll, 1977**: By a vote of 46 percent to 37 percent, a public sample interviewed by Gallup endorsed the installation of air bags in all new cars. Young adults 18 to 29 years old were strongest in their endorsement, voting 65 percent to 27 percent in favor. Women of all ages endorsed installation by the substantial margin of 51 percent to 27 percent, while men were against it by a 47 percent to 42 percent margin. Seventy-six percent were opposed to a \$25 fine for non-use of seat belts (19).
- **Motor Vehicle Manufacturers Association, 1976**: In personal interviews with a national sample of drivers, 50 percent agreed that "driving should be made more safe than it is today by building more safety devices into cars which cannot be ignored, turned off or removed." However, after being exposed to the concepts of mandatory belt use laws, mandatory air bags, and insurance coverage dependent on belt use, only 26 percent of the respondents said they wanted to see additional laws or regulations requiring more or different safety equipment on cars. Fifty-seven percent said they wanted "to see things stay as they are."

Of the 62 percent who said they knew what an air bag was, only 29 percent said they probably or certainly would vote in favor of mandating these restraints (62 percent against). Of the 24 percent who knew what air bags were and could put a price on what they were willing to pay for them, 35 percent said they were willing to pay more than \$100.

Twenty-nine percent of all respondents said they would probably or certainly vote in favor of mandatory seat belt use (66 percent opposed), while 16 percent of all respondents said they would probably or certainly favor insurance companies stipulating "no accident coverage if not wearing seat belts" (78 percent opposed) (20).

- **Opinion Research Corporation, 1976**: Telephone interviews and mail surveys of owners of 1975 model year VWs were conducted to determine attitudes toward active and passive belt systems, both of which had starter interlocks. Owners of the passive belt systems had higher reported use rates than owners of active systems (79 percent and 50 percent, respectively), and more favorable attitudes toward the system. Seventy-three percent of passive belt owners rated their seat belts "comfortable to wear," compared with 45 percent of active system owners. Eighteen percent of passive belt owners and 82 percent of active belt owners reported their interlocks to be disconnected. Owners of active systems said that two-thirds of the interlock disconnections occurred before they bought or first took delivery of the car (21).
- **Market Research Group, Inc. for General Motors Corporation, 1975**: A national random telephone survey of owners of 1975 model year Oldsmobile Toronado, 98, and 88 cars found that three percent had purchased air bags. Of the purchasers, over half reported that they had bought the bags at their option or that they would have ordered them had they not been on the car.

Of the respondents without air bag-equipped cars, eight percent said they had considered buying the air bags but only 16 percent of them had been "very serious" about it. The major reasons given for not having bought air bags were "not made known of availability" (23 percent), "extra expense" (13 percent), and "never thought about it" (13 percent). At the time of purchase, 32 percent indicated they were not at all aware that air bags were available, and 24 percent said they were only a little aware.

Sixty-eight percent of the respondents thought the public would be interested in air bags at a cost of \$100, and 38 percent thought there would still be interest at \$200. At \$300, only 19 percent felt the public would be interested (22).

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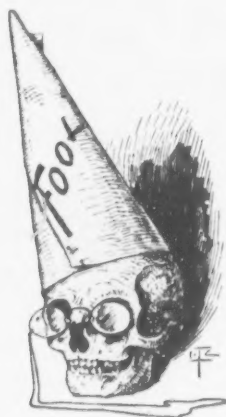
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Business and Society Review

ATTACHMENT 2

Fall 1980 Number 35

GM fought the gas mileage standard. It has also fought the air bag, even though the device could save thousands of lives a year.



GM and the Air Bag: A Decade of Delay

by BEN KELLEY

SINCE IT PROMISED in 1970 voluntarily to make air bags available on all its cars by the 1975 model year, General Motors has pursued a policy of withholding that technology from the public, encouraging delay of federal passive restraint requirements, and discouraging consumer interest in the handful of air bag-equipped cars it manufactured in the mid-1970s. Yet the Department of Transportation's estimate is that equipping all cars on American roads with air bags would save at least 9,000 lives a year and prevent hundreds of thousands of serious injuries. Here is a chronology of GM's decade of air bag delay:

August 1970: In a submission to the National Highway Safety Bureau and a letter to eighty-two members of Congress who had urged NHTSA to stand fast on its passive restraint standard, General Motors pledges to voluntarily provide air bags, first as options and then as standard equipment, on all its cars by the 1975 model year. Describing the plan to NHTSA (predecessor to the National Highway Traffic Safety Administration), GM says:

Ben Kelley, senior vice-president of the Insurance Institute for Highway Safety, wrote this article with the help of the Institute staff.

For the 1974 model year, the air cushion would be made standard equipment on those 1973 models on which it was an optional item while extending the customer option to several additional models of General Motors passenger cars. We estimate approximately one million 1974 model General Motors cars could be equipped with the air cushion in this second year. In the fall of 1974, the air cushion would be made standard equipment on all 1975 General Motors passenger cars.

(On the strength of that promise, NHTSA eventually delayed implementation of its proposed passive restraint standard.)

November 1970: NHTSA issues its standard requiring passive restraint protection effective July 1, 1973—a six-month delay from the January 1, 1973 date that it had been proposing for the standard.

December 1970: General Motors petitions NHTSA to slide the effective date of its passive restraint standard an additional two months, from July 1, 1973 to September 1, 1973.

1971: General Motors learns, in a survey it would not make public until 1979, that a significant consumer preference exists for air bags—between 40 and 50 percent of customers surveyed by the company would pay some significant amount for such protection. GM's summary of the survey results states that "the Air Cushion Restraint concept is a viable one to the consumer" and was "preferred over the passive harness system because it afforded equal protection, but was judged far superior in all areas of style and convenience."

TWO YEARS MORE

March 1971: The National Highway Traffic Safety Administration (NHTSA) grants a two-year delay in the passive restraint standard—until the 1976 model year—because of Nixon Administration fears about its economic impact on the auto industry.

February 1973: General Motors says that its "production plant experience" in building 1,000 air bag-equipped 1973 Chevrolets has "contributed greatly to the planning facilities and methods for higher-volume air cushion system production."

August 1973: Ed Cole, GM's president, writes DOT that GM is cutting its planned production of air bag-equipped cars during the 1974-1975 model years from more than 1 million to no more than 150,000 units. Cole blames both DOT's standard-making process and GM tooling problems.

October 1973: Allstate Insurance Co., subsequently followed by many other insurers, announces a 30 percent discount on medical and no-fault personal injury coverages for air bag-equipped cars.

February 1974: A GM spokesman acknowledges to the Insurance Institute for Highway Safety *Status Report* that it is unlikely the company will build even 150,000 air bag-equipped cars in the 1974-1975 model years. (As it turns out, only about 10,000 were built during the 1974-1976 model years.)

March 1974: NHTSA proposes a revised passive restraint standard to take effect with the 1977 model year.

April 1974: The IIHS *Status Report* notes that the passive restraint standard—scheduled to take effect no earlier than the 1977 model year—has already been outpaced by the performance levels of some existing air bag systems. It summarizes a range of research, including DOT's own Research Safety Vehicle, demonstrating that air bags can substantially exceed the standard, even in small cars.

May 1974: Two former GM officials, John Z. DeLorean and Robert F. McLean, tell a NHTSA meeting that air-bags for front-seat occupants should cost about \$148 per car, not \$225 to \$335 as auto companies have claimed. McLean adds that industry "hesitancy" about air bags is "very misplaced. . . . I think the air restraint system could be a very powerful marketing plus."

May-June 1974: GM asks DOT for further delays in the passive restraint standard's effective

date, claiming that the standard's requirements "in addition to being unreasonable, failing to meet the need for safety and not being stated in objective terms, . . . are neither demonstrably practicable nor appropriate for all vehicles."

September 1974: Ed Cole, a strong supporter of air bag technology, retires as president of GM.

December 1974: NHTSA issues cost-benefit analyses showing that air bags are superior to lap-shoulder belts.

April 1975: A GM spokesman tells the Insurance Institute for Highway Safety that the company may abandon all plans to offer air bags even as optional equipment on 1977 and 1978 models. He tells the IIHS *Status Report* that the decision will make "a hell of a dent" in any possible federal passive restraint requirements for those years.

May 1975: During NHTSA's five-day public meeting on passive restraints, GM reports extensively on successful laboratory and field experience with air bags. Stating that its evidence "has not indicated a significant deployment-induced injury or loss of control hazard," GM adds that "there have been no established cases where the

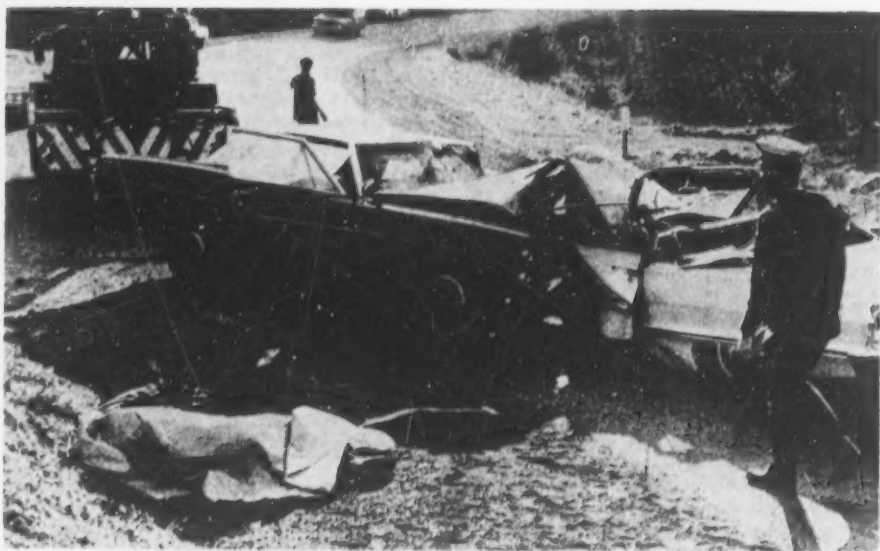
Another Ford Fiasco

"The Transportation Department found that 1970-1979 model Ford Motor Co. car and light-truck transmissions have a safety defect that could lead to a major recall. . . .

"The agency said that some Ford transmission designs suffer design 'errors' that allow the vehicle to shift suddenly from park to reverse even if the driver has shifted the gear-shift lever fully into park. Other designs make drivers feel they've shifted into park when the transmissions are actually between park and reverse, and sudden park-to-reverse slippage can also occur on those vehicles, the safety agency said. . . .

"The agency said it received reports of more than 6,000 accidents, including 98 fatalities and 1,710 injuries, tied to the park-to-reverse hazard. The agency also said it has gotten more than 23,000 complaints from Ford owners of incidents involving that transmission problem."

—the Wall Street Journal
June 12, 1980



Seven people were killed in this head-on crash in Oregon.
The only survivor was a six-month-old baby.

air cushion failed to deploy" when it should. But GM, hedging even further its earlier promises, says it is "a very, very severe question" as to whether it will be making 100,000 air bag-equipped cars—even by the 1977 model year.

August 1976: An IIHS poll finds that "a great majority of car-buying Americans prefers automobiles with increased crash protection that is completely or at least partly automatic—such as air bags, or belts and bags in combination," rather than active protection.

November 1976: A front-page exposé in the *Wall Street Journal* examines GM claims that consumers do not want air bags. It finds that although GM put airbags into 10,000 luxury cars during the 1974-1976 model years—and sold all those cars—GM "failed to push" the system. The air bag "received no wholehearted promotion," the *Journal* reports. "Instead, the company and its dealers actively discouraged sales."

December 1976: DOT Secretary Coleman's passive restraint decision calls for agreements under which GM and other companies will voluntarily build air bag-equipped cars. A maximum of 300,000 such cars are promised by GM, with a minimum commitment of 30,000 cars over two

model years. The program is to begin in September 1979. GM's air bag cars are to be intermediate-sized models, and the air bags are to retail for \$100. GM agrees to "specific measures to assure that the cars are marketed effectively," Coleman says.

January 1977: Former GM president Ed Cole, in letters to the IIHS president, says:

I firmly believe the air cushion system can be made to work successfully at a reasonable cost. . . . The technology is available and the need is there. I think the only way passive restraints are going to get to first base is to make them mandatory. Another test will prove nothing. Let the passive air cushion evolve like all other systems.

Cole also lists numerous reasons why belt systems cannot protect as effectively as inflatable systems in crashes.

BUREAUCRATIC TURNAROUND

March 1977: Secretary Adams, putting aside the Coleman decision, reopens the passive restraint case. "I am concerned that the negotiated contracts between DOT and the auto makers

represent a 5-8 year delay in any decision to install passive restraints in all passenger cars."

May 1977: In comments to the docket, GM expresses pessimism that the public will accept automatic restraint, based on its experience with the air bag-lap belt system marketed in 1974-1976 models.

June 1977: A Gallup Poll shows that by a vote of 46 to 36-percent, the public endorses the installation of air bags in all new cars.

July 1977: Secretary Adams announces his decision to mandate the phased introduction over a six-year period of passive restraints. He permits a full four-year lead time before the first passive restraints will be required in large cars and calls for continued auto company participation in the Coleman plan until then:

This lead time accords with General Motors' requested lead time to accomplish the change for all model lines. Equally important, the four-year lead time represents a continuation to its logical conclusion of the early voluntary production of passive restraints represented by the December 1976 decision.

September 1977: At a Senate hearing on the Adams decision, IIHS provides the results of its analysis of GM's own data comparing real-world crashes of GM air bag-equipped cars with those of non-air bag cars. The analysis shows that "serious head, face, neck, and torso injuries (that is, injuries that produce the overwhelming bulk of fatal and disabling conditions) are down 44 percent" for air bag cars compared with non-air bag cars.

September 1977: At a hearing before the House Subcommittee on Consumer Protection, GM testifies that still another demonstration program is needed to provide real-world data. GM says it would support a demo program, promising to put air bags in its full-sized cars in 1981. GM also says it will pursue a program to introduce automatic belts in a small Chevrolet model and a luxury model in the 1979 model year.

1978: A GM study involving more than 1,000 GM car owners—not made public until 1979—concludes: "The air cushion restraint system . . . received the highest ratings on all operation, comfort, and appearance items evaluated."

January 1978: Eaton Corp., a leader in air bag development, drops out of the supply business because it fears that future sales will not justify its investment. Eaton says that auto companies

will probably equip smaller cars with passive belts instead of bags.

June 1978: Former GM official Robert McLean writes NHTSA that in mid-1970, he was relieved of his position as project manager for air cushion system development because GM's Washington office had decided that:

I was too aggressive in promoting the air cushion systems and that it was known that I was in disagreement with the tendency on the part of GM to slow down on the pace of air cushion development in the second half of 1970.

September 1978: Two surveys, one by Volvo and one by Peter D. Hart Associates under contract with NHTSA, find that air bags were the overwhelming favorite over passive belts. On questions concerning consumer attitudes toward manual belts, respondents indicating they don't wear belts say it is because the belts are uncomfortable and inconvenient. And 37 percent say nothing could be done to make them wear their belts most of the time.

December 1978: Allied Chemical, a pioneer in air cushion restraint development which has also done extensive work for GM on the inflatable restraints, announces it is "reluctantly" dropping out of the business. It cites its own projections that "a great majority of automobiles" would be equipped with passive belts instead of air bags to meet the DOT standard.

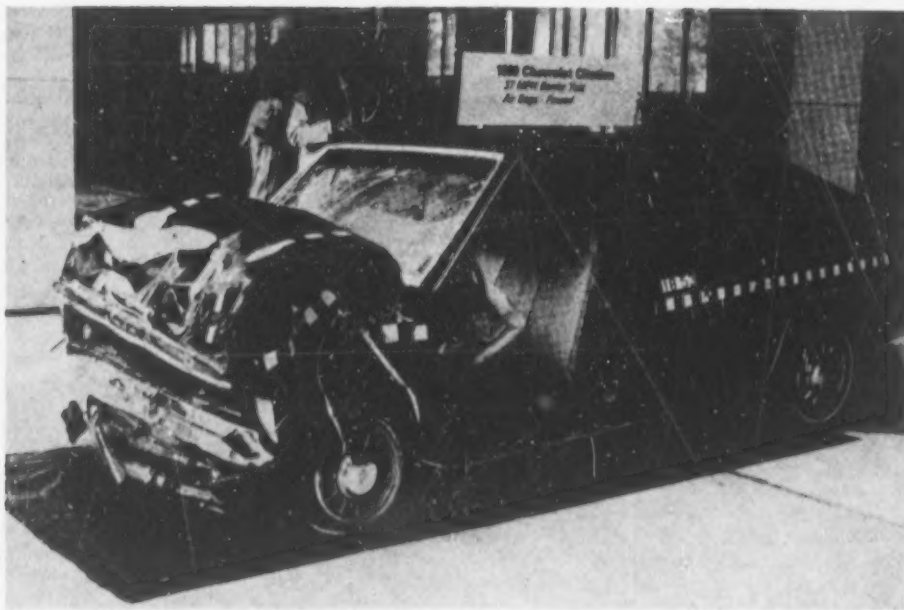
1979: A GM study (not publicly released until later) based on in-depth interviews with Chicago

Coal Company Blows Stack

"BUCKHANNON, W. Va.—In what is believed to be the first court counterattack by a corporation against environmentalists, a coal mining company here is suing two small anti-pollution groups and the coordinator of one of them for \$200,000 in libel damages.

"The environmentalist defendants say it is the truth that hurt the D.L.M. Coal Corporation. They have accused the stripmining company of creating a major environmental problem by allowing sulfuric acid to drain from its coal seams on the hillsides into the trout streams below."

—the New York Times
August 11, 1980



The air bags in this 1980 Chevrolet enabled the car to meet Department of Transportation safety standards for a 37 m.p.h. head-on crash into a barrier.

owners of large GM cars reports: "With passive belts and an Air Cushion Restraint System available, 70 percent of the total principal-driver sample selected the air bag even when they were told its cost would be more than four times the cost" of a passive belt system."

June 1979: NHTSA disputes GM's estimated price of \$581 for air bags in new cars. In a letter to GM, the agency notes that the estimate is substantially higher than Ford's, and also that it is "more than double your earlier estimates" at higher production levels.

August 1979: The Automatic Occupant Protection Association, whose members are air bag suppliers, warns in an IIHS *Status Report* interview that continued delay in the offering of air bags by car companies seriously threatens the existence of the industry.

September 1979: In answer to a question from Phil Donahue on a television show, E.M. Estes, president of General Motors, admits that GM

"didn't really push" air bags when it made them available as options in a few 1974-1976 luxury models.

ENDANGERED CHILDREN

October 1979: GM warns of alleged problems concerning possible injury hazards to out-of-position children. Safety experts doubt that the problems are valid or that they should hold up availability of air bags. However, GM says that because of the problems, it will not offer air bags as options during the 1981 model year.

December 1979: GM announces it has solved its supposed problems involving air bags and possible hazards to out-of-position children and promises to "offer a full inflatable restraint system as an option at the start of the 1982 model year."

December 1979: John Burton, the Chairman of the House Government Activities and Transportation Subcommittee (Government Operations

Committee), announces that in response to a subcommittee request, GM has reluctantly turned over to him four internal GM consumer surveys. The studies—carried out in 1971, 1975, 1978, and 1979—all show very strong consumer demand for air bags in new cars.

March 1980: Mercedes-Benz announces that it will equip all 1982 model cars sold in the United States with air bags—including cars not covered by the DOT standard. It thus becomes the first manufacturer to give such protection to Americans on a routine basis—and possibly the only one offering air bags to buyers in 1982 at all.

March 1980: GM informs NHTSA that, its earlier commitments to the contrary, it "does not plan to offer inflatable restraints on medium- or small-size cars" in the 1982-1986 model years, but may still offer them on full-size 1982 cars.

March 1980: An informal survey of dealer showrooms by the IIHS reveals a dearth of cars available with Chevrolet's highly touted automatic safety belt.

April 1980: A GM memo circulated on the Hill in support of the Stockman Amendment says the company plans to "accommodate" a level of air bag demand in 1982 models involving about 250,000 full-size car purchasers, a reduction from previous plans to produce 400,000.

June 1980: GM announces that it has cancelled plans to provide air bags as options in its large 1982 models—despite having promised to do so only a few months earlier both in its "1980 Public Interest Report" and in a filing with NHTSA. This means that GM will offer no air bag-equipped cars in the 1982 model year. Some

100 companies supplying air bag components to GM stand to be affected so severely that they may not be able to stay in the business.

June 1980: At a breakfast meeting with reporters at the National Press Club, GM Chairman Murphy estimates that GM would save \$20 million by delaying optional air bags from the 1982

"I have always thought it would be easier to redeem a man steeped in vice and crime than a greedy, narrow-minded pitiless merchant."

—Albert Camus

to 1983 full-size cars. He is then asked by a reporter for Newhouse Newspapers, "What about the 7,000 lives?" Murphy responds:

Well, the 7,000 lives, that's when you put air bags in every car. So, we're only talking about one year, one year. They're talking about air bags . . . when the air restraints are on every vehicle on the road. When is that going to happen? As I keep trying to remind you, it isn't going to happen for probably 15 years. You're not going to replace all those other cars on the road.

Had GM honored its pledge made in 1970 to provide airbags first as options and then as standard equipment on all its cars by the 1975 model year, a substantial majority of all GM cars now on the road would be equipped with air bags. □

[The following information was subsequently received for the record:]

QUESTIONS OF THE MAJORITY AND THE ANSWERS THERETO

Question 1. In your testimony you note the activities, or lack thereof, of the Federal government and the automobile manufacturers in terms of promoting automobile safety options. Another potentially important group in this is automobile dealers. What role do you believe dealers play in terms of promoting—or failing to promote—available automobile safety options?

Answer. Since dealers are a broad, constant and influential source of information for car purchasers, they clearly have a tremendous potential for creating consumer interest in improved motor vehicle safety performance, and thus a potential for stimulating marketplace interest in safety features. By and large, however, they clearly are not fulfilling that potential.

Scattered examples of dealer promotion of interest in motor vehicle safety do exist. The attached advertisement run by New York area Chevrolet dealers a few years ago, promoting interest in the Chevette as a small car safer (on the basis of its performance in NHTSA crash tests) than other competitive small cars is one example (Attachment 1). The ad was roundly criticized by auto industry interests, incidentally (Attachment 2.) Similarly, Fiat, Volvo and occasionally other manufacturers have worked with dealers to promote an interest in safety (Attachments 3 and 4).

But the much more common situation is typified in the attached articles showing a disinterest by both manufacturers and dealers toward marketing safety. The Wall Street Journal article of November 11, 1976, documents the failure of both General Motors dealers and the manufacturer itself to promote the sale of air bags in new cars, even when such safety features were being offered as limited options. The Washington Post article of August 24, 1980, makes it clear that manufacturers were no interested in making use of NHTSA's crash test results to sell their cars, even when their cars performed better than competing models. Finally, the Status Report survey of auto dealers carried out in 1980 showed a serious lack of interest in promoting sales of passive belts. (These news articles are included as Attachments 5-7.)

Frankly, it is hard to see how any worthwhile, sustained initiative for the marketing of improved safety performance levels in new cars can be created without dealer cooperation—cooperation at least as vigorous as dealers now offer in promoting sales of such nonessential options as stereo cassette players, specialty roof coverings, power windows, and high-priced optional wheel covers.

Question 2. The automobile industry claims that a vehicle occupant must be wearing a seat belt in order for an air bag to be effective. What is your opinion of this assertion?

Answer. The claim that an occupant must be wearing a seat belt for an air bag to be effective is nonsense and flies in the face of both real-world crash experience and Federal Motor Vehicle Safety Standard (FMVSS) 208. The crash experience of General Motors and other cars equipped with air bags makes it very clear that the air bag does a superior job of protecting unbelted occupants in front and front angle crashes, even at speeds considerably higher than those specified in the NHTSA crash test program and the existing restraint standards. Moreover, FMVSS 208 requires that in frontal crash tests air bags meet specified force reduction levels both with and without the use of safety belts.

Attached are examples of real-world crashes in which the occupants, unbelted, were protected from injury by the air bag (Attachment 8).

Question 3. In your view, what should be the philosophy behind the promulgation of motor vehicle safety standards? Should they be minimum performance standards, designed to protect the public from unreasonable risks to safety or should they be aimed at attaining the highest level of safety that technology will allow? What role should cost and public acceptance of the standard play?

Answer. It was hoped when the National Traffic and Motor Vehicle Safety Act of 1966 was passed that minimum safety performance standards would become, in effect, floors above which manufacturers would compete for consumer interest and sales, by advertising and selling levels of safety greater than those specified by the standard. In fact, however, the manufacturers have used the standards as ceilings; in their design and manufacturing processes they work to just barely exceed the standards (a process known as "skinning up") for compliance purposes.

Performance standards are far more desirable than design standards in the motor vehicle safety program, because—if manufacturers were to take advantage of their marketplace opportunities—such standards would permit design competition as well

as superior performance competition. They also would encourage technological innovation by manufacturers in their quests to meet the standards more efficiently and at lower cost. However, mechanisms must be found to encourage manufacturers to compete by selling safety superior to the standards' performance levels. Otherwise, those levels must be kept as high as necessary to protect as many people as possible against unnecessary crash death and injury.

An "unreasonable" risk, it can be argued, is one that could be avoided when (1) a car purchaser has the opportunity to buy the "highest level of safety that technology will allow" at least as an option, and (2) chooses to take that opportunity. But since nowhere in the market today are such levels being offered, whether as optional or standard features, every American car purchaser is forced at present to face an "unreasonable" risk in terms of crash protection when purchasing a new car.

Attachments¹

QUESTIONS OF THE MINORITY AND THE ANSWERS THERETO

Question 1. How well to mandatory seat belt laws work?

Answer. The short answer is that where such laws are in effect, they work with mixed results. In general, they have brought about increased belt use, but the increases have not been nearly as large as had been hoped, nor have they always been sustained.

Levels of seat belt use are measured by surveying daytime usage by drivers and front seat passengers. However, at night, when fatal crash rates are higher, it is quite possible that young people, alcohol abusers, and others who may particularly need belt protection are not using their belts. This is also indicated by occupant fatality and injury experience. I have attached a more detailed set of papers that comment on the effectiveness of mandatory belt use laws. (See Attachments 1-3.)

Within the past few years, laws requiring or urging the restraint of young children in motor vehicles have been passed in more than 15 states. The early results of these laws are encouraging, but continued evaluation of their effectiveness is in order. In states where child restraint use has been measured, usage rates have gone up, somewhat. (See Attachments 4 and 5.)

Question 2. How successful are voluntary seat belt campaigns?

Answer. Virtually none has been successful, despite the investment of huge amounts of money, time, and commitment in both the private and government sectors. The long and extremely well-researched history of such campaigns is that they bring about little or no increase in belt use, and that even where modest increases are obtained, they turn out to be transitory and not sustainable. The attached, more detailed materials document the failure of such campaigns. (See Attachments 6 and 7.)

Question 3. Does the IIHS have any data regarding usage of detachable passive belts?

Answer. There is no specific information about usage rates for detachable passive belts. However, passive belt use generally, as reported by credible studies, has been substantially higher than active belt use. For example, the observed seat belt usage rate has been almost 80 percent in Volkswagen Rabbits with automatic belts, compared to about 35 percent for Rabbits with manual belts. (See Attachment 8.) Extensive surveys by the National Highway Traffic Safety Administration show similar results—a doubling of the belt use rate in Volkswagen Rabbits with automatic belts, as compared to the rate experienced with manual belts. This difference has translated into a substantially lower occupant fatality rate for the Rabbits with the automatic belts.

Since the automatic belts on both the Chevettes and Rabbits are designed to discourage permanent defeat of the system, belt usage rates for these cars might not reflect the rates that would prevail if belt systems were detachable. A broad range of belt designs are available to car manufacturers; if they choose designs that are easy to use and difficult to disconnect permanently, there would be higher belt usage rates and, hence, fewer deaths and injuries. (See Attachment 9.)

Even if manufacturers choose detachable belts, some advantages would be realized. As data submitted to the U.S. Court of Appeals indicated, "the fact remains that the societal benefits of passive restraints are so great that even the lowest common denominator among such restraints, the permanently detachable belt, is more than justified by its relatively insignificant cost."

Question 4. Should the current side impact protection standard be modified?

¹ The attachments have been retained in the committee files.

Answer. New cars being sold in the marketplace today do not provide adequate protection to occupants in side impacts—doors too often fail to stay closed, thus permitting occupant ejection, and sides too often crush in on the people inside. The National Highway Traffic Safety Administration some time ago announced plans to improve its requirements for side impact protection, and has carried out research—including development of the Research Safety Vehicle—leading toward that goal, but has more recently dropped this activity. The result will be much unnecessary death and injury in future new cars that continue to have obsolete designs from the standpoint of side impact protection.

The IIHS currently is preparing a review of the side impact protection issue, which includes a description of current and recent work by Volvo, Association Peugeot Renault, and MCR to mitigate side impact damage, especially as it affects near-side passengers. This report will be available in May, at which time we will forward a copy to your office.

Question 5. Does the IIHS have data concerning the annual loss to our society of automobile accidents?

Answer. According to an extensive study sponsored by the IIHS a few years ago, motor vehicle crash injuries represent a burden on U.S. economy of well over \$20 billion per year. This study, entitled *The Incidence and Economic Costs of Major Health Impairments*, by N. S. Hartunian, C. N. Smart, and M. S. Thompson, was published in 1981 by Lexington Books. Its principal findings were as follows:

The cost of crash injuries is, among health problems, second only to cancer. The cost of injuries somewhat outranks that of coronary heart disease, and greatly outranks the cost of stroke, the other leading killers of Americans.

By 1975, motor vehicle crash deaths and injuries were already generating \$14.4 billion in annual costs. In 1980 dollars, the total cost is over \$20 billion.

The yearly incidence of new cases of motor vehicle injury exceeds four million. This incidence falls by far the heaviest on younger Americans—those under 35 years old, including especially infants and children.

Further detail on this subject is provided in Attachment 10, which is an article based on the book.

Question 6. Can you explain the 10.2 percent decline in fatalities in 1982 over 1981?

Answer. The decline in fatalities was quite consistent with the pattern—consistent over many years—of crash fatality declines associated with downturns in the economy.

Question 7. Manufacturers claim they can't sell safety because they can't advertise it; there is no test to measure the overall safety of automobiles to enable them to use comparative advertising. Would you agree?

Answer. For some time there has been considerable comparative information available on specific safety aspects of new cars—including results of the National Highway Traffic Safety Administration's 35 mph barrier crash tests, Highway Loss Data Institute injury claims results, and benchmark performance levels set by the government's Research Safety Vehicle. It clearly is a matter of "don't wait" rather than "can't" in the decision of manufacturers not to sell safety in general and crash protection in particular in their new cars and their marketing of new cars. Those who bear the brunt of this inexcusable failure are the people killed and injured in cars that are, from a crash protection standpoint, obsolete even as they roll off today's new car assembly lines.

Attachments.¹

Senator DANFORTH. Next we have Mr. John Synnestvedt.

STATEMENT OF JOHN SYNNESTVEDT, COUNSEL, REPRESENTING SAINT-GOBAIN VITRAGE

Mr. SYNNESTVEDT. I represent the Saint-Gobain Vitrage Co. that Mr. Kelley mentioned.

I have one of these windshields here this morning at the end of the table, if you would like to take a look at it. You can actually feel the plastic that protects the occupants during a crash.

This windshield was made for a Plymouth Grand Fury. It was actually made for the Maryland State Police evaluation program that

¹ The attachments have been retained in the committee files.

Mr. Kelley mentioned. You will notice that there is on the interior of the windshield a thin layer of plastic, about 20 mils thick. That is a very special high performance polyurethane, optically as perfect as it can be and interferes in no respect with the normal use of the windshield.

It is applied to a standard HPR [high penetration resistance] windshield, a windshield that has been used in this country since 1966, so it picks up and adds onto all the safety, penetration resistance and energy absorption characteristics of the high penetration resistance windshield.

What it adds is a tough layer of plastic between the occupants and the glass. In the event of a crash the layer of plastic maintains its integrity, keeping the occupants from touching the broken glass. In the event of the striking of stone from the outside, you get no shower of splinters into the inside because the layer of plastic contains the splinters.

Senator DANFORTH. Does this scratch and fog up after a period of a couple of years and present a less clear vision to the driver than the usual windshield?

Mr. SYNNESTVEDT. Fortunately, it does not. Tests in the laboratory and field tests in Europe have demonstrated that there is no tradeoff. You do not have to say, we are going to have a hazy windshield in order to have laceration protection. You can have an optically clear windshield, durable for the life of the car, and still have the laceration protection.

Senator DANFORTH. These have been on cars for how long?

Mr. SYNNESTVEDT. They have been on cars in significant numbers in Europe beginning in 1978, in smaller numbers in special experimental cars for as long as 9 years. If there were going to be any deterioration, it would certainly begin to show up in 9 years.

There is not even any incipient deterioration, any incipient indication of a future problem. There are about 100,000 cars on the highways in Europe now, principally made by Peugeot but also made by Audi, Opel, and Porsche, and these cars are giving no problems of visibility. No feedback comes from the customers of a negative kind.

The timing of your hearing this morning is most fortuitous from the standpoint of this windshield, because we have just received the word that the National Highway Traffic Safety Administration has approved and issued the notice of proposed rulemaking, which has been under study for some time, which would accommodate this new antilacerative windshield. It is now open for a 45-day comment period, and the final rule is still up in the air.

In addition, the hearings are timely because we have the currently ongoing Maryland State Police evaluation program which involves Chrysler cars and Ford cars. We have very recently announced a new program with General Motors involving 2,500 cars which are going to be equipped with Serviflex windshields for use with rental fleets, and there will be followup studies on the performance of those windshields.

The previous witness, Mr. Kelley, mentioned the RSV's. In that program in 1979, there was also a Calspan RSV. The Calspan RSV's did include these windshields.

Senator DANFORTH. What would be the added cost per car of these windshields?

Mr. SYNNESTVEDT. It is difficult to say with precision because there is no large volume manufacture in the United States as a base for experience.

Incidentally, let me say that my client, Saint-Gobain Vitrage, is planning to make arrangements for U.S. manufacture. It is clearly not feasible to import windshields in large numbers into this country. There is no threat to U.S. jobs in the automotive or glass industries.

If produced in volume, the added cost to the automotive companies will be in the range, on the order of \$30. Now, it depends on the pricing policies of the automotive companies, on their after-market customer relations and so on, how that translates into a consumer price.

Senator DANFORTH. Have you tried to sell these to U.S. car manufacturers?

Mr. SYNNESTVEDT. My client has had extensive discussions with all of the U.S. car manufacturers, and we are pleased to report that both Ford and General Motors are currently apparently very seriously studying the windshield. I cannot report more than that. We seem to be making progress.

In Europe, the European car companies are much farther down the road with this windshield. However, the lack of U.S. approval, the regulation in the United States barring the windshield, holds it up on a worldwide basis, because of two things: In the first place, the large size of the U.S. market; but in the second place, the very large number of countries in the world which follow the U.S. standard.

For example, Mercedes sells 70 percent of its total production to countries that follow the U.S. standard. So if there is something that does not comply with the U.S. standard, it is difficult for Mercedes to use it in its production for sale to other places.

Senator DANFORTH. Thank you very much, sir.

Mr. SYNNESTVEDT. Thank you, Mr. Chairman.

[The statement follows:]

STATEMENT OF JOHN SYNNESTVEDT

FACT SHEET—THE CASE FOR AN ANTI-LACERATIVE WINDSHIELD

BACKGROUND

Intensive research, conducted since 1979, reveals that every year, hundreds of thousands of Americans suffer pain, disfigurement and even psychological trauma from lacerative injuries caused by automotive windshields.

Consumer Products Safety Commission estimates dramatically show that more eye injuries are related to motor vehicles than to any other single product. For 1981, the number of eye injuries was set at 29,773—some 3,800 involved the windshield.

Many groups, including the National Society to Prevent Blindness, argue that the vast majority of such injuries would probably not have occurred, or would have been considerably less severe, if motor vehicles were equipped with anti-lacerative windshields.

The incidence of serious facial laceration continues to be unacceptably high—both in terms of human suffering and costs—despite the availability of a new generation of safety windshield that has been proven in extensive use in European cars.

The choice of this type windshield, with its inner layer of special high performance plastic, for an advanced Research Safety vehicle developed by the Calspan Cor-

poration under a research contract from the U.S. Department of Transportation further attests to the contribution of the anti-lacerative windshield to safer driving.

However, present interpretation of existing Standard 205 by the National Highway Traffic Safety Administration (NHTSA) prohibits the use of such windshields in cars built for the American market. Administrators claim the windshields do not meet the letter of the current rule on the ground that the abrasion test required for the outside of the windshield is not specified to be applicable only to the outside and thus can be construed to also apply to the inside. The plastic layer on the inside, while providing ample abrasion resistance for the inside, cannot meet the stringent requirements designed to assure the very high level of abrasion resistance needed for the exterior surface which is subjected to windshield wipers, high-speed particle impacts, road grit and salt, and the like. The result is that a tough abrasion test designed for the outside is being interpreted so as to block the use of an anti-lacerative layer on the inside. Without U.S. approval—which many consumer advocates and such members of the national news media as the New York Times claim has been slowed by an inflexible bureaucracy—the anti-lacerative windshield will not be adopted worldwide because many other countries use American safety standards.

FREQUENCY OF LACERATIVE INJURIES

Research conducted during 1982 suggests that more than 310,000 people suffer lacerative injuries caused by windshield glass each year, and that the cost of emergency room treatment for lacerative injuries probably exceeds \$8.5 million annually.

Approximately 70 percent of these injuries require medical attention over and above examination and cleaning of the lacerations. At least 18 percent of the injuries are sufficiently severe to require further treatment, primarily by plastic surgeons.

The 1982 research projects that 46,000 cases of lacerative injuries are treated by office-based plastic surgeons at an estimated cost of some \$4.5 million. In addition, the findings project approximately 48,000 cases requiring some type of further treatment.

Psychological stress

While the bulk of continuing treatment is by plastic surgeons, some patients are referred to other specialists, such as ear, nose and throat specialists, oral surgeons and ophthalmologists. A large majority of plastic surgeons surveyed report that patients with facial lacerations suffer psychological stress, and must, in some cases, be referred for psychological/psychiatric treatment by other than emergency room physicians and plastic surgeons.

Thus, hundreds of thousands of Americans each year receive painful and disfiguring lacerations—even psychological trauma—and the cost of treatment for lacerative injuries caused by automotive windshields involves millions of dollars. This situation exists despite the fact that the justly famous High Penetration Resistance (HPR) windshield, a laminate of two sheets of glass with a film of polyvinylbutyral (PVB) in between, has been the standard in U.S. motor vehicles since 1966. The HPR windshield has greatly reduced the possibility of windshield penetration. Before the development of this windshield, the toll was even greater.

Critical situation

Technological advancement notwithstanding, the situation remains critical. Even a minor collision, or the impact of a stone on the outside, can produce a shower of sharp, tiny particles within the car as the windshield is shattered. When the head strikes the windshield during a crash, the HPR windshield's penetration-resistant plastic layer does not prevent the glass on the occupant's side from smashing and turning into a mass of cutting edges. The question now is: what can be done to improve safety while minimizing costs?

THE ANTI-LACERATIVE WINDSHIELD

An anti-lacerative windshield has been developed in Europe. Its construction starts with an HPR windshield, but it has an added extra layer of a special, high performance, clear plastic on the inside surface. This layer is a shield that guards the occupants from contact with shattered glass. When the windshield is struck from the outside, it breaks and bulges inwardly, but the inner plastic layer contains the sharp fragments of broken glass, thus maintaining a smooth inner surface and keeping any glass fragments from entering the car. The special safety shield performs an even more important function when the windshield is struck from the inside by the head of the driver or passenger. The inner surface remains smooth.

The glass fragments resulting from the shattering of the windshield are kept safely in place behind the protective shield created by the clear plastic film on the inside surface of the windshield. In either case, the occupants are protected from lacerative injury.

A PROVEN ANTI-LACERATIVE WINDSHIELD IS AVAILABLE NOW

The first anti-lacerative windshield—Securiflex inner guard—was developed by Saint-Gobain Vitrage, a leading European manufacturer. Saint-Gobain has no plans to manufacture and ship the Securiflex inner guard windshield to the U.S., for installation in American-made cars, and no present plans to make Securiflex windshields in the U.S., preferring instead to make the technology available for U.S. manufacture. The additional cost to the automobile companies of the inclusion of the anti-lacerative windshield in American-manufactured cars is estimated to be on the order of \$30 per vehicle on a volume production basis.

TESTING THE NEW ANTI-LACERATIVE WINDSHIELD

The new generation anti-lacerative windshield has already proved itself in real-life driving and exhaustive laboratory tests.

The Securiflex inner guard windshield is in use on European highways in more than 50,000 cars manufactured by Audi, Porsche, Opel, and Peugeot. These automobiles have been exposing the inner guard windshield to attack from all elements: tropical heat, extreme cold, sea atmosphere, Alpine high altitude, ultra-violet attack, dust, dirt and the lack of care that would be typical of many drivers.

Laboratory tests

Preceding all the road testing was a long series of tightly controlled laboratory tests, conducted not only in the laboratories of Saint-Gobain, but also in many independent laboratories of universities, automobile manufacturers, and others. These concentrated not only on barrier impacts, head injury measurements taken on anthropomorphic dummies and all other crash conditions, but also on the many conditions to which windshields are exposed in actual use. Even further tests that simulate such occurrences as exposure to chemical attack, scratches, cleaning, cigarette smoke and food spills have been followed and precisely documented.

Field tests of more than five years duration, exposing Securiflex windshields to all types of climatic conditions, have demonstrated absolutely no deterioration in properties or performance, not even the sort of incipient beginning of deterioration which could be viewed as an indicator of later difficulty.

On European initiative, a widely recognized and approved new standard (which the Securiflex windshield passes) has been registered by the United Nations.

THE STATUS OF THE ANTI-LACERATIVE WINDSHIELD IN THE U.S.

One of America's most advanced Research Safety vehicles was developed by the Calspan Corporation under a research contract from the U.S. Department of Transportation. Among the features of the experimental vehicle—which foreshadows worthwhile safety developments—is the Securiflex inner guard windshield.

According to the ETL Testing Laboratories, Inc., of Cortland, New York, recognized for decades as an authority in the testing of automotive glazing, the Securiflex inner guard windshield meets all current standards for U.S. use.

THE U.S. BLOCKING REGULATION

Standard 205 requires a very high level of abrasion resistance for a windshield because of the aggressive abrasive factors to which the exterior of a windshield is exposed: windshield wipers, high speed particle impacts, ice and snow scraping, salt from winter roads, service station attendant cleaning, and so forth. Accordingly, Standard 205 specifies Abrasion Test 18—but says absolutely nothing about which side of a windshield specimen is to be exposed to the rigors of Test 18.

Since May, 1979, Saint-Gobain has sought formal U.S. approval of its new generation anti-lacerative windshield, with an effort to obtain NHTSA acquiescence to an interpretation of the existing Standard 205 which would permit (not mandate) the introduction and use of an anti-lacerative windshield such as the Securiflex inner guard.

Exterior versus interior testing

ETL Testing Laboratories, a NHTSA-approved laboratory, has never tested both sides of a windshield, always considering that Test 18 was to check the performance

of exterior of a windshield. So long as specimens submitted to ETL were symmetrical, i.e. had glass exposed toward the inside as well as the outside, it made no difference which side was tested.

Thus, when presented with the Securiflex specimens by Saint-Gobain, ETL tested the side which would be glazed toward the exterior of the vehicle; that is, the glass-exposed side. The specimens, as expected from years of successful laboratory and road testing, passed Test 18 with no difficulty whatsoever, and ETL accordingly issued a favorable report and AAMVA duly certified the inner guard windshield.

NHTSA denies approval

However, NHTSA turned down Saint-Gobain's requested interpretation of existing Standard 205, first indicating that both sides of a specimen must be subjected to Test 18, and later, that either side must pass Test 18. Because the fourth ply (an inner layer made of a new and special, high performance plastic) was judged to scratch more easily than glass, it was decided that the new generation windshield does not meet the letter of the current rule. AAMVA then withdrew its certification, citing the safety office administrators' interpretation.

As a result, the new generation anti-lacerative windshield—which the Insurance Institute for Highway Safety claims could reduce the severity of hundreds of thousands of head injuries annually—is unavailable to the American driving public.

THE IMPORTANCE OF U.S. APPROVAL

U.S. approval is a vital necessity for any important automotive glazing innovation for two reasons. First, the sheer size of the U.S. market makes it a key to success, worldwide, particularly as auto makers move more and more toward producing "world" cars. Second, European auto companies count, very substantially, on exports from their home countries to countries following the U.S. standards. For example, even though Mercedes has given its technical approval to the Securiflex inner guard windshield, Mercedes is not in a position to use the windshield because Mercedes exports approximately 60 percent of its production to countries requiring compliance with U.S. standards. Inventory and production quality control problems proliferate if a car maker must hew to one standard for some countries and another standard for others.

Without U.S. approval, the new generation anti-lacerative safety windshield has severely limited potential no matter how many other countries and foreign car manufacturers may be ready and willing to accept it.

PRESENT STATUS

All the various possible routes to U.S. Government approval continue. Despite the documentation, however, no decision has yet been reached.

In the meanwhile, despite the availability of new technology which could greatly improve the situation and enhance driving safety, windshield laceration continues—with hundreds of thousands of painfully injured and maimed victims every year.

WHAT IS SAINT-GOBAIN?

Saint-Gobain, the largest manufacturer of automotive glazing in Europe with more than 50 percent of the market, is a 300-year-old company with diverse manufacturing facilities throughout the world. It ranks among the 100 largest industrial groups in the world, and manufactures glass, insulating materials, pipe, roofing and siding materials, paper, castings and machinery, valves, fittings, meters, packaging, refractory products and fiber glass reinforcement for plastics.

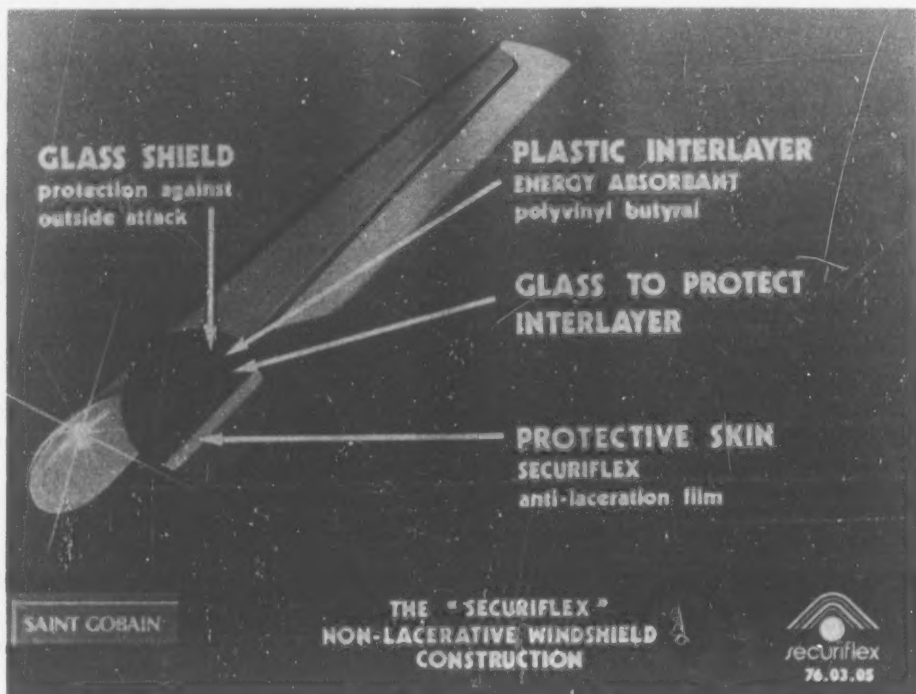
The company has been heavily involved in research and development of many innovative products, and is a world leader in technical innovation in the automotive glazing field, as is evidenced by the Securiflex inner guard anti-lacerative windshield.

The Securiflex windshield is not only a new product in Saint-Gobain's broad line of automotive glazings: it embodies an imaginative new concept in glazing.

Historically glazing producers (both building and vehicle) ignored the fact that the two side faces of a glazing material are typically, indeed virtually intrinsically, exposed and subjected to very different conditions and functions. Glass was always made symmetrical—naturally with symmetrical properties—and then placed for use in most decidedly not symmetrical exposures. The exterior surface must be enduring and proof against wind and weather. The interior need not have such attributes but must be serviceable, esthetically satisfying and should not be aggressive in case of fracture.

Recognizing the fundamental differences in the properties needed for the interior and the exterior, Saint-Gobain developed a new, special, high performance plastic which can be laminated to glass and which has the requisite optical clarity to assure visibility and light, but also makes possible, for the first time, a glazing material which is, itself, non-aggressive in the event of fracture and, further, which, in nearly all situations involving glass fracture, is capable of protecting nearby occupants from the danger of broken glass. Non-symmetrical conditions are met with a non-symmetrical material having non-symmetrical properties.

Securiflex—the result of a blending of that special extra ordinary insight we like to call “common sense”, and diligent, innovative, applied research.



[The following information was subsequently received for the record:]

QUESTIONS OF THE COMMITTEE AND THE ANSWERS THERETO

Question. Do you have any reasonably specific data as to the performance of the Securiflex windshield in the cars in which it has been installed in Europe or in the U.S. test fleets? Is there any reason, to your knowledge, to expect that the Securiflex windshield would not be effective—especially in terms of visibility—in the United States?

Answer. Saint-Gobain Vitrage (“SGV”) has “specific data as to the performance of the Securiflex windshield” in a number of cars of company employees, and other individuals, who were prepared, when Securiflex windshields were installed in their cars, to have the company make follow-up evaluations, from time to time, respecting the performance of the windshield in actual use. The results of this program have been summarized and presented to NHTSA in the form of Exhibits 112 and 112(a), copies of which are available to the Subcommittee, if needed. Stated in brief, these two Exhibits show that the data gathered on the in-use performance of the Securiflex windshields reveal virtually no discernible deterioration in the inner plastic layer on the windshields over extensive time periods even as long as approximately nine years.

BEST AVAILABLE COPY

SGV further has general information respecting Securiflex windshields installed in much longer numbers of cars manufactured by Peugeot, Audi, Opel and Porsche in regular production and sold in the normal course of business to customers. Such cars have been equipped with Securiflex windshields in Europe starting in small volume in 1978 and increasing year by year since. There is now a total of about 100,000 cars on the road in Europe which are equipped with Securiflex windshields. Respecting such cars, production experience with many glazing products supplied, to the European automotive industry would indicate that, if in fact there were performance difficulties with the Securiflex windshields in use in the field in Europe, customer complaints and dealer complaints would have arisen and would have been referred back, eventually, to SGV. Thus, the fact that no complaints from the field have reached SGV is a rather clear indication that the performance of the Securiflex windshields in the field is satisfactory.

Respecting the use of the Securiflex windshield in U.S. test fleets, there is an Interim Report on the Maryland State Police test fleet which has been filed with NHTSA as Exhibit 113 and a copy of which is available to the Subcommittee, if needed. Summarizing this report, the performance of the Securiflex windshields in the Maryland State Police test fleet has been satisfactory in every respect. One State trooper was in a crash in which his head struck and broke a Securiflex windshield. The trooper did not suffer any lacerations from the broken windshield glass. Further interim reports from the Maryland State Police test fleet are expected in the future and will be filed with NHTSA. The General Motors test fleet is still in production; it is expected that periodic reports will be issued respecting this test fleet.

To the knowledge of SGV, there is no reason whatsoever "to expect that the Securiflex windshield would not be effective—especially in terms of visibility—in the United States". On the contrary, SGV has every reason to expect that the Securiflex windshield will be fully effective in the United States. The range of temperature, humidity, dusty, etc., conditions to which SGV has subjected the Securiflex windshield construction more than equals the range of conditions which can be expected to be encountered by cars on highways in the United States.

Question. In your estimation, what proportion of laceration injuries would be prevented by use of the Securiflex windshield?

Answer. Up to 1966, in spite of the use of laminated windshields (consisting of a layer of polyvinyl butyral, or "PVB", plastic sandwiched between two sheets of glass), there were many crashes reported each year in which the occupants were hurled wholly or partially through the vehicle windshield and suffered grievous, frequently fatal, lacerative injuries. Beginning in 1966, the high-penetration-resistant ("HPR") windshield became the standard windshield in the United States. The HPR windshield consists of a laminated windshield having a layer of PVB plastic twice as thick as previously and with controlled adhesion between the glass and the PVB. The HPR windshield prevents the occupant's head from penetrating the windshield in all but the very most severe crashes. By thus greatly reducing penetration, the HPR windshield correspondingly greatly reduced the incidence of life-threatening lacerations.

However, there have continued to be on the order of hundreds of thousands per year of painful and disfiguring facial lacerations resulting from broken windshield glass. The Securiflex windshield adds to the standard HPR construction a fourth layer of special, high performance plastic on the inside which guards the occupants from contact with broken glass fragments. Up to the "penetration velocity", it is estimated that the Securiflex windshield should prevent lacerative injuries. The "penetration velocity" means the crash velocity above which the occupant strikes the windshield with such force that there is some rupturing of the PVB interlayer. At the present time the reports of crashes above the penetration velocity are quite rare. The Securiflex windshield can be expected to be effective to substantially reduce lacerations even in crashes above the penetration velocity.

Summarizing, it is believed that the Securiflex windshield should virtually prevent lacerative injury caused by occupant impact with the windshield during a crash.

Further, the Securiflex windshield protects the occupants from laceration or eye damage when a stone or other object strikes the exterior of a windshield, because the inner plastic layer contains the shower of glass splinters which would otherwise be propelled into the occupant compartment.

Senator DANFORTH. The next witness is Ms. Susan Baker of Johns Hopkins School of Hygiene and Public Health.

STATEMENT OF SUSAN BAKER, DEPARTMENT OF HEALTH SERVICES ADMINISTRATION, THE JOHNS HOPKINS SCHOOL OF HYGIENE AND PUBLIC HEALTH

Ms. BAKER. Thank you, Senator Danforth. Thank you very much for the invitation to testify here this morning.

I would like to speak about the workplace as a site of problems with motor vehicles as an occupational hazard. Some of my prepared testimony I would like to abbreviate and submit the entire testimony and attachments for the record.

Senator DANFORTH. Could you pull the microphone just a little closer to you, please?

Ms. BAKER. Yes; thank you.

The workplace has two kinds of environmental hazards, those that kill slowly, such as asbestos and chemical carcinogens, and those that kill quickly, such as electric current and the kinetic energy of crashes.

The slow killers have aroused great public concern. We have come to expect that workers will be protected from them. The hazards that kill quickly, however, tend to be attributed to bad luck or error on the part of the worker, and then are quickly forgotten.

Hazards in the second group, the ones that cause acute injuries, were the subject of a recent study by the Johns Hopkins School of Hygiene and Public Health. We reviewed all of the deaths in Maryland from work-related injuries that occurred in a 1-year period. The results have been a surprise to many people.

Usually, mines and factories come to mind when we think about work-related injuries. But three-fourths of these work-related deaths occurred out of doors, and only 5 percent involved any sort of fixed machinery. The great majority—57 percent—involved vehicles: industrial vehicles, road vehicles, and other transportation vehicles (table 1).

The largest single cause of fatal injuries in workers proved to be the road vehicle. Cars and trucks caused one-fourth of all work-injury deaths in Maryland. If anything, these Maryland figures are conservative. A Wisconsin study found that 37 percent of work-injury deaths were due to highway vehicles.¹

Nationally, the Bureau of Labor Statistics estimates that 30 percent of all occupational fatalities in companies with 11 or more employees involve road vehicles.² That is three times the number of deaths from industrial vehicles, which are the second leading cause of fatal injuries. According to the National Safety Council, motor vehicles cause 4,500 work deaths and 2,000 injuries every year³ in this country.

Truckdrivers are of special concern because there are roughly 2 million of them, also because their death rate is much higher than the average worker's. In Wisconsin, for example, a truckdriver has approximately nine times as great a chance of being killed on the job as the average worker. In Maryland, 1 out of every 10 workers

¹ Karlson, T. A., Baker, S. P., and Morton, B. F. "Fatally Injured Truck Drivers." Proceedings of the 21st Conference of the American Association for Automotive Medicine, Vancouver, Sept. 16, 1977, pp. 367-378.

² Bureau of Labor Statistics, bulletin No. 2130, table 9, causes of fatalities resulting from occupational injury and illness in 1979-80, units with 11 or more employees.

³ National Safety Council, "Accident Facts," 1981 edition, Chicago, 1981.

killed is a truckdriver. In the United States, in 1981,⁴ 897 occupants of heavy trucks died.

While truckdrivers are by far the largest group of workers whose workplace is a road vehicle, others include taxi drivers, police officers, sales and service, or delivery personnel, and many Government employees.

Drivers of heavy trucks need such things as truck cabs that do not collapse easily in a crash and that make it possible to remove injured occupants quickly. All too often, it takes hours to extricate an injured truckdriver who has been trapped in his cab.

They need steering wheels that protect them in crashes, rather than focusing the forces on a small area of the abdomen. In one recent Maryland study, as in earlier studies, we found that many truckdrivers had received severe injuries to the abdominal organs, a finding that is probably associated with the narrow rim and almost horizontal orientation of many wheels, in combination with steering wheels that are not designed to attenuate crash forces.

Tragically, the National Highway Traffic Safety Administration, the only agency that has authority to set occupant-protection standards for trucks, has given little attention to this problem. Many occupant-protection standards that were set 10 to 15 years ago for passenger cars have never been established for trucks. These include standards for protection from impact with the vehicle interior, windshield mountings, side-door strength, roof-crush strength, impact with the steering wheel, and so on.

The truck steering wheel has been indicted many times for its role in causing injuries to truckdrivers. Yet there has never been even an advanced notice of proposed rulemaking that would stimulate much-needed advances in this area. I hope this hearing today will prompt NHTSA to give greater priority to the design of truck steering wheels and to other forms of passive protection in trucks.

A second reasonable objective at this time is for the Government and other employers to give high priority to crash protection whenever they order fleets of cars. In the name of fuel economy, many fleets of cars have been downsized, even though this can greatly increase the hazard to an employee in a crash because of the likelihood of death being so much greater in small cars.

Can you imagine the employers making comparable changes in the environment of other kinds of workers, removing protective devices from machinery or increasing the workers' exposure to carcinogens? Such changes probably would not be considered by the employer. Certainly they would not be tolerated by the workers, by OSHA, or by a knowledgeable public.

Clearly, fleet purchases should be influenced by the need for worker protection, basing decisions on the relative crash performance of vehicles. In addition, proven technologies, such as passive restraints, even before they become standard equipment in cars, could be ordered in large fleets of Government-owned and company-owned cars.

My emphasis has been on passive protection rather than seatbelt use because even in the occupational setting seatbelt use require-

⁴ National Highway Traffic Safety Administration, data from fatal accident reporting system for 1981.

ments have generally had little effect. Restraint use is not common among truckdrivers, even though it is required by the Bureau of Motor Carrier Safety.

Even with the presence of a strong regulatory environment, as one has in the U.S. Army, this does not necessarily increase restraint use. In a preliminary study at Fort Meade, Md., only 10 out of 102 occupants of Army vehicles entering or leaving the base were observed to be using restraints.

In other words, their seatbelt use rate was the same as the 10 percent average for other people, despite an Army regulation that clearly says:

All Army personnel using Army motor vehicles with restraint systems will use them when the vehicle is in motion. Drivers will not move the vehicle unless all occupants are secured. Senior occupants will enforce this requirement.

Some increase in the use of seatbelts by Government personnel, truckdrivers, and other occupational groups might be achieved through incentives or enforcement, but there is no evidence that the use of active-restraint systems will ever eliminate the need for better automatic-passive protection.

In conclusion, let me give you an example of effective automatic crash protection now provided to Government employees, in this instance to Army personnel exposed to the risk of post-crash fires in Army helicopters.⁵ In 1968 and 1969, post-crash fires were responsible for 60 percent of all deaths in potentially survivable crashes. Then, as shown in this slide, by installing crashworthy fuel systems the Army virtually eliminated deaths from burns in helicopter crashes.

Comparable automatic crash protection should be available to every worker whose job exposes him or her to the all too common, too lethal forces of car crashes. The deaths just 5 days ago of three Secret Service agents serve as a tragic reminder of this most serious occupational hazard.

Thank you very much.

Senator DANFORTH: Thank you, Ms. Baker.

It is your view that a mandatory seatbelt law would not work very well, is that correct?

Ms. BAKER. I would be very much in favor of having a mandatory seatbelt law, because I believe it has the potential, if it is enforced, for increasing seatbelt use and accomplishing some reduction in injuries to motor vehicle occupants. And other countries, such as Australia for example, have what they consider very successful laws which have reduced motor-vehicle-occupant deaths at least 15 or 20 percent, which is a very hefty reduction.

But that still leaves 80 or 85 percent of the deaths continuing to occur. This is why I say, even if we are successful enough to have some forms of either seatbelt use required for employees or even laws requiring seatbelt use by everyone in this country, that would never get us off the hook in terms of the need to give better automatic protection.

Senator DANFORTH. Your view is that laws or regulations designed to change behavior on the part of drivers with respect to the

⁵ Singley, George T., III, "Army Aircraft Occupant Crash-Impact Protection," Army Research, Development and Acquisition magazine. July-August 1981.

use of seatbelts would possibly have some marginal effect, and you would support them. However, you do not think they would be any substitute for passive restraints?

Ms. BAKER. That is correct. Too often we find that the people who are not restrained by seatbelts in countries, such as the European countries and Australia, the people who are not wearing seatbelts are in one way or another the people who are most likely to be involved in crashes, restraint use being less at nighttime, in rural use, by intoxicated people. So that the people most needing protection are less likely to be protected.

Senator DANFORTH. Mr. Kelley, I wonder if you would like to respond to the same question. If someone suggested that instead of passive-restraint standards or airbags, instead that there be mandatory requirements that people use the seatbelts that they have. Is it your view that this would be effective? Would it be a good substitute for passive-restraint rules?

Mr. KELLEY. Well, as Ms. Baker, I believe, also believes, the situation is not an either/or situation. Mandating the use of existing manual restraint systems, safety belts, would be a good thing to do because it would bring some protection to some of the people who own all of these cars already equipped with those systems.

But it should never be thought of as a substitute for or alternative to providing superior, 100-percent automatic coverage in car crashes. The experience with mandatory safety belt laws is that at best—and at best is probably the Scandinavian countries and Australia—they bring about the increase in use of belts in the daytime under optimal observed conditions, and that may mean that as high as 75 percent of the population is protected.

Those levels do not seem, however, to apply to nighttime driving, when crash risk is greater, when the drunks are out there, and people are more at risk. And they do not show up in crash injury results as having the effect we hoped they would have.

So, yes, by all means, let us get mandatory belt laws if we can, to get some use out of the systems we have today. But that should never be considered as an alternative to the far superior technology of airbags, for instance.

Senator DANFORTH. Thank you, Mr. Kelley.

I want to ask you, Ms. Baker, is it your view that there are some structural changes, design changes, that could be incorporated into work vehicles which would make them safer? Is that right?

Ms. BAKER. Absolutely; I am not an engineer and I do not pretend to be able to suggest what those changes are. But after all, the first thing a truckdriver will hit in a forward impact is going to be whatever is right in front of him. If that is a steering wheel with a narrow rim, the forces will be focused on his abdomen. If it is something else that presents a broader surface to spread out the same energy forces, there will be less likelihood of injury.

In our Maryland study, as I recall six out of seven of the truckdrivers who were killed where mechanical energy forces were the agent of death had severe lacerations to the liver. Those may be small numbers, but it is a much, much higher proportion than we see in car drivers killed in crashes. We see that again and again, and people have reported it for decades.

Senator DANFORTH. Do you have any thoughts as to where we go to find out what sorts of standards or what sort of design changes should be incorporated?

Ms. BAKER. I would think you might go to the Teamsters and the truckdrivers, not only the Teamsters but the independents and a variety of truckdrivers, who would have some experience with the kinds of controls that would both give them the ability to control their vehicle and at the same time to provide protection.

But certainly design engineers, given the problem of how do you allow a driver to work well within the confines of his working environment and receive better protection, ought to have some answers. We can protect hazardous cargo in crashes of 80 miles an hour by putting it in the right kind of container. I think that we could also protect drivers.

Senator DANFORTH. How much attention has this issue of safety with respect to work vehicles received from NHTSA or from any other Federal agency?

Ms. BAKER. To the best of my knowledge, very, very little. There was a report by NHTSA last year on heavy trucks and accident causation—I am not sure of the exact name of it—which does look at the problem of heavy truck safety and from many different aspects.

But in terms of really doing anything that would stimulate some activity in this area of occupant protection for the truckdrivers, I am not aware of it. There finally are standards that came into effect 4 years after the standards for passenger cars saying that seatbelt systems would have to be installed. But in terms of automatic protection, I know of none.

Senator DANFORTH. Or steering wheel design or the way cabs are built and so on, there is very little attention to your knowledge that has been given to this?

Ms. BAKER. To my knowledge, virtually none.

Senator DANFORTH. Virtually none. Do you have any idea why that would be? Is it because other things have received greater priority?

Ms. BAKER. I think initially in the whole area of automatic crash protection very properly the emphasis was given to the kinds of vehicles that there were the largest numbers of, where changes might be made most rapidly. Now I think it is time for us to look at the kinds of vehicles whose occupants are exposed because of the number of miles they drive and for many other reasons, because of the loads that are behind them in crashes, whose occupants are at exceptionally high risk of being killed in crashes, and that is the truckdriver.

Senator DANFORTH. Again you say that these on the road accidents account for about 25 percent of fatalities?

Ms. BAKER. In Maryland, 25 percent. Nationally, it is about 30 percent in firms that employ 11 or more employees. My guess is, it might be even higher for smaller firms.

Senator DANFORTH. Thank you very much.

Ms. BAKER. Thank you very much.

[The article follows:]

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Fatal Occupational Injuries

Susan P. Baker, MPH; Judith S. Samkoff, ScM; Russell S. Fisher, MD; Carol B. Van Buren, MS

Deaths resulting from work-related injuries during a one-year period in Maryland were identified and reviewed. Of 148 workers killed, all but two were male. Transportation vehicles were involved in 41% of the deaths, with road vehicles accounting for 25% of the total. Other major groups involved nonroad land vehicles (16%) and firearms, primarily handguns (11%). Two thirds of the workers died at the scene or were dead on arrival at the hospital. Head injuries were the most common cause of death. Eleven percent of the workers tested had blood alcohol concentrations of 0.08% by weight or greater. The majority of the deaths involved either hazards that are not addressed by the Occupational Safety and Health Act of 1970 or workers in categories that are excluded by law from regulation under this act.

(JAMA 1982;246:692-697)

EACH year, occupational injuries in the United States result in an estimated 13,000 deaths, 245 million lost workdays, and \$25 billion in direct and indirect costs.¹ For ages 17 to 64 years, one fourth of all nonfatal inju-

ries and one sixth of all fatal injuries (exclusive of homicides and suicides) occur on the job.² Despite their importance, work-related injuries are rarely subjected to sound epidemiologic investigation. To our knowledge, a complete series

of fatal occupational work injuries (all those in a specified time period for a defined population or geographic area) has never been described. In large part, this is because no single source of data permits easy identification of all cases. In Wisconsin, for example, 161 occupational injury deaths in 1976 were identified from review of death certificates and workers' compensation records; only 76% of the total could be identified from death certificates alone, only 57% from workers' compensation records. Only 35% were reported to the Occupational Safety and Health Administration (OSHA).³

This study was undertaken to identify all deaths due to occupational injuries in a defined geographic area, to describe the characteristics of those killed and the circumstances of their deaths, and to explore the implications for preventing fatal work-related injuries.

METHODS

Work injury deaths were defined as deaths resulting from acute exposure to physical agents while at work, whether employed by others or self-employed. Part-time workers were included; unpaid

workers excluded. Deaths were included in the case series if the injury occurred in Maryland and the person died in 1978.

Cases were identified through the following four sources: (1) a manual search of records at the Office of the Chief Medical Examiner of Maryland (OCME), in which each injury death, excluding suicides and children younger than 15 years, was reviewed to see whether the injury had occurred at work; (2) a review of records at the Maryland Division of Labor and Industry, based on workers' compensation claims; (3) a review of cases reported to the Maryland Occupational Safety and Health Agency; and (4) a listing, provided by the Maryland Division of Vital Records, of cases for which death certificates indicated "injury at work."

RESULTS AND FATAL EVENTS

In 1978, a total of 148 people died of work-related injuries that occurred in Maryland. Except for medical examiner records, no single source identified more than two thirds of all the cases that eventually were identified. The OCME had records for 96% of the cases in the series; missing were three deaths that occurred out of state and therefore were reported in other jurisdictions and three deaths due to late complications of minor injuries that should have been reported to the OCME. About one tenth of all cases were missed on our manual search of OCME records but subsequently were found after being identified through other sources.

All but two of the 148 workers were men. They ranged in age from 15 to 83 years, with a median age of 37 years. Ages 16 to 24 years were underrepresented and ages 35 to 44 years were overrepresented among the deaths, compared with their proportions in the employed population (Table 1).

For editorial comment
see p 723.

From the Department of Health Services Administration, The Johns Hopkins School of Hygiene and Public Health, Baltimore (Miss Baker, Samkoff, and Van Buren and Dr Fisher); and the Office of the Chief Medical Examiner of Maryland, Baltimore (Dr Fisher). Miss Samkoff is now with the Medical College of Pennsylvania, Philadelphia, and Ms Van Buren is now with the University of Rochester (NY) Medical Center.

The opinions, findings, and conclusions expressed herein are those of the authors and do not necessarily reflect the views of the sponsors of this study.

Reprint requests to Department of Health Services Administration, The Johns Hopkins School of Hygiene and Public Health, 615 N Wolfe St, Baltimore, MD 21205 (Miss Baker).

Table 1.—Age Distribution of Workers Killed in Maryland and Employed Population, 1978*

Age, yr	All Deaths	Children Aged 15 yr	
		No. (%) of Deaths	No. (%) Employed
15	1	—	—
15-17	2	8(0)	96,000(60)
18-19	6	5(4)	106,000(6)
20-24	10	9(7)	289,000(16)
25-34	41	33(25)	482,000(26)
35-44	80	37(28)	598,000(33)
45-54	26	—	—
55-64	17	42(30)	687,000(30)
65-69	6	6(6)	55,000(3)
Total	148	133(101)†	1,980,000(100)

*Source: 1978 State Annual Planning Information Report, Department of Human Resources, State of Maryland.

†Does not add to 100 because of rounding.

Nonwhites were greatly overrepresented, constituting 34% of the deaths and 17% of the employed population. Overall, the death rate was seven per 100,000 civilian workers employed in Maryland in 1978 (Table 2).

Transportation vehicles, including boats and airplanes, were involved in 41% of all deaths (Table 2). The largest single group, accounting for 37 (95%) of the deaths, involved road vehicles. Road vehicles were especially prominent in the transportation and utilities industries, where they accounted for half of the deaths. They were involved in about one fourth of the deaths in the manufacturing and construction industries.

Half of the deaths occurred in manufacturing, construction, and transportation or utilities industries. One fifth (20) of all workers killed were public employees, including 14 members of the military. At least 22 (15%) were self-employed or worked for family members.

In 117 (79%) of the deaths, the etiologic agent was mechanical energy, conveyed by either moving objects or the impact of moving people with relatively stationary surfaces, as in the case of falls. Table 3 lists the inanimate objects ("vehicles") and living vectors most directly involved in energy transfers.

The most common cause of death was head injury, which in 31 cases was known to be the only severe injury. Severe head injuries, rated 4 or higher on the Abbreviated Injury Scale,² were described in 43 (45%) of the 96 cases for which injury severity ratings could be made. (Abbreviated

Injury Scale scores were not assigned in six deaths due to mechanical asphyxia, 31 cases where the injuries were not caused by mechanical energy, and 15 cases with incomplete information on injury severity.) Severe abdominal injuries were especially common in truck drivers; seven of the 13 truck drivers with mechanical energy injuries had lacerated livers.

About two thirds (68%) of the workers were dead at the scene or on arrival at the hospital. Eighty-two percent of the deaths occurred within 24 hours of injury. The 14 workers (11%) who died a week or more after injury were not representative of the entire series. This subgroup included four of the five thermal injury cases and the two female workers, both of whom died of complications after minor injuries.

Eighty-five workers were tested for alcohol (Table 4). (These workers represented 79% of the 108 for whom valid blood alcohol concentrations [BACs] might have been determined at death, ie, excluding the 40 who survived for more than four hours or who drowned and were not found until many days had elapsed.) Thirteen had measurable BACs, with a median of 0.09% by weight. Four of the 13 had BACs of 0.01% to 0.02%, concentrations that are less likely to impair performance substantially. The other nine (11% of the workers tested) had BACs of 0.08% or greater, generally considered evidence of impairment when detected in a driver. Six of these nine workers with relatively high BACs were injured on Monday afternoon or Tuesday.

The 148 workers were killed in 131 events, including seven events in which two workers were killed and one boat collision that took 11 lives. Two thirds of the events occurred between 8 AM and 4 PM. Exceptions to this pattern were shootings, which were least common in the mornings, and road vehicle crashes, which were fairly evenly distributed from midnight to 4 PM. Eleven percent of the deaths occurred on weekends; the remainder were spread fairly evenly over the five weekdays. No seasonal patterns were evident.

Circumstances of Injuries

Road Vehicles.—Thirty-seven workers' deaths involved moving road vehicles:

	No. of Deaths
Occupants killed in crashes	25
Truck drivers	16
Taxi drivers	2
Others	7
Occupants who fell from trucks	2
Repairing vehicles	2
Pedestrians	2
Working on highway or roadside	4
Trying to stop a runaway truck	1
Collecting garbage, run over by garbage truck	1

Heavy trucks, primarily tractor trailers, were involved in at least 23 of the 37 road vehicle deaths. Sixteen occupants of heavy trucks were killed. Extrication was often a problem: five fatally injured tractor-trailer occupants were pinned inside their overturned vehicles. The importance of delay in extrication is suggested by the fact that in three of these cases, death was attributed to asphyxiation caused by mechanical compression of the chest, with no other injuries found; another driver died of inhaling naphthalene fumes from the ruptured tank of his overturned tanker before he could be rescued. None of the fatally injured vehicle occupants was known to have been using a seat belt.

Nonroad Land Vehicles.—Among the 23 nonroad vehicles, the largest group was cranes, which were involved in seven deaths (Table 5). Rollovers of other vehicles caused four deaths. Three workers were killed when wheels exploded; two of the three wheels had multipiece rims that separated during inflation. One of these deaths occurred despite the precau-

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Table 2.—Fatal Event by Industry

Type of Event	Industry										Total, No. (%)
	Manufacturing	Construction	Quarrying/Mining	Agriculture/Fishing/Forestry	Trade	Transportation/Utilities	Services	Public	Military	Other/Unknown	
Road vehicle	8	5	1	0	2	11	4	3	0	3	37 (26)
Boat	0	0	0	0	0	1	1	0	11	0	13 (11)
Airplane	0	0	0	0	1	2	0	1	2	1	7 (5)
Marine vehicle	11	2	0	2	1	2	1	4	0	0	23 (16)
Fixed machinery	6	0	0	2	0	0	0	0	0	1	9 (5)
Fall from height	1	8	0	2	0	0	1	0	0	0	13 (9)
Shooting	0	0	0	0	6	3	0	4	0	1	14 (11)
Other	0	0	1	0	1	0	2	3	1	0	8 (6)
Total	31	21	2	12	13	23	8	15	14	6	149 (101)†
Rate / 100,000	10	21	230	62	9	26	8	6	14	7	

*Denominator data not available.

†Does not add to 100 because of rounding.

‡Source of denominator data: US Department of Labor, Bureau of Labor Statistics, Report on Employment for 1978, Maryland; and Maryland Department of Human Resources.

Table 3.—Agents and Vector/Vehicles in Work Injury Deaths

Etiologic Agent	Vector or "Vehicle"	No. of Deaths
Mechanical energy	Road vehicle	32*
	Train	2
	Other land vehicle	18
	Airplane	7
	Boat	6
	Exploding fires/ribs	3
	Fixed machinery	6
	Dirt or cement (cave-in)	5
	Bullets	16
	Horse	1
	Falling person	15
	Other	4
	Subtotal	117
Electrical energy	Overhead powerline	6
	Interior wiring	2
	Subtotal	7
Thermal energy	Burning gasoline	1
	Hot liquid	2
	Ambient air (hyperthermia)	2
	Subtotal	5
Naphthalene	---	1
Carbon monoxide	---	6
Water	---	12
Total	---	148

*Includes two falls from moving vehicles. Five additional deaths related to road vehicles are classified under trains, naphthalene, water (one each), and carbon monoxide (two).

tionary measure of changing the tire in a protective cage.

Boats.—Of the 16 boat occupants, 11 died when their Coast Guard cutter collided with another ship. It sank within minutes, its "watertight" compartments having been left open for ventilation. Six men sustained impact injuries; five others drowned below deck. Emergency lights were limited to the engine room, so the rest of the ship remained in darkness as the crew tried to escape the rapid flooding. The life jackets (all located in a

single bin) and one life raft were rendered inaccessible by the crash. The other life raft was crushed.¹

Planes.—The seven persons killed in plane crashes included two naval aviators killed after one wing of their T38 jet touched the runway during a landing and takeoff exercise. Engine trouble was cited in four of the five nonmilitary crashes. In two cases, the sources of injury included batteries that struck pilots in the back of the head. Two pilots were killed while student pilots were at the controls.

Falls.—The 13 men killed in falls from heights included four painters and two tree trimmers. Only one worker was wearing a lifeline; vibrations from his saw may have detached the line from a tree. Five men were working on scaffolds, three of which collapsed or tipped. Reflecting the greater severity of injury in longer falls, the median height fallen was about 16.8 m for those who died at the scene, about 6.1 m for those who were still alive on arrival at the hospital.

Shootings.—Of the 16 men who were shot, 11 were killed in holdups: three taxi drivers, three grocery store owners, two gas station operators, two vendors, and one other. Ten of the guns were hand weapons, one was a rifle, and five were not identified. Three police officers were killed by service revolvers: one inadvertently; by another officer, the others by a 15-year-old who had taken one of their revolvers.

Miscellaneous.—The six carbon monoxide deaths included two truck drivers in postcrash fires, a police officer trapped in an elevator during a fire, a steelworker exposed to fumes, and two shiphands repairing a pump in the hold of a ship. Five electrocutions resulted when overhead power lines were contacted by a crane, a grain auger, a television antenna that was being installed, and a tree trimmer.

COMMENT

During the past quarter century, the death rate for occupational injuries in the United States has dropped from 39 to 13 per 100,000 workers.¹ As

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Table 4.—Event by Blood Alcohol Concentration

Type of Event	No. of Subjects					Total	
	Tested: Blood Alcohol % by Weight			Not Tested			
	0.00	0.01-0.09	≥0.09	Valid Test Possible	Valid Test Not Possible		
Road vehicle	22	2	4(14)*	28	5	4	37
Marine vehicle	11	0	3(20)	14	4	8	23
Shooting	9	2	1(0)	12	0	4	16
Other	30	0	1(0)	31	14	27	73
Total	72	4	9(11)	86	23	40	149

*Percentages given in parentheses represent the percent with blood alcohol concentrations greater than or equal to 0.09.

Table 5.—Deaths Related to Nonroad Vehicles

	No. of Deaths
Cranes	
Pinned worker against stationary object	3
Dropped objects on worker	2
Contacted overhead power line, electrocuted worker	1
Partially dismantled boom fell on worker	1
Subtotal	7
Forklifts	
Overturned on worker	2
Ran over workers who had fallen off	2
Justified worker, causing him to fall	1
Dropped objects on worker	1
Subtotal	6
Tractors	
Overturned on highway	1
Ran over worker while in neutral gear	1
Subtotal	2
Bulldozers	
Pulled backward on incline, running over worker	1
Steel cable attached to bulldozer snapped, hitting worker	1
Subtotal	2
Backhoes	
Overturned on worker	1
Contacted overhead power line with bucket arm	1
Subtotal	2
Front-end loader	
Caught worker's shoe, pulling him under	1
Tire explosions in shop	
Forklift tire	1
Tractor tire	1
Backhoe tire	1
Subtotal	3

the hazards of earlier years have been reduced, new problems have taken their place.⁶ Preventive activities, however, tend to reflect traditional problems. Today, the occupational safety literature, regulations, and training programs continue to emphasize injuries in the manufacturing industry, where only 14% of all work-related deaths occur.⁷ On the other hand, most occupational safety programs virtually ignore transportation vehicles, which are involved in about 40% of all work injury deaths. Even in the manufacturing industry, more workers are killed by road vehicles

than by fixed machinery.

Our findings for Maryland are generally consistent with national statistics, but the latter provide no details on the characteristics of the workers killed or the circumstances of their deaths. By studying the records for all work-related deaths in an entire state, we were able to describe the epidemiology of these deaths, understand how they occurred, and identify population groups—especially men and nonwhites—whose jobs place them at high risk of fatal injury. In addition to the many researchable questions raised by our findings, the

results of this study provide new and important insights into the problem of fatal occupational injuries.

Occupational Groups and Risks Not Addressed by Federal Law

For many reasons and in a variety of ways, large groups of high-risk workers have been virtually excluded from the protection offered by the Occupational Safety and Health Act of 1970. Many are not receiving effective protection from other government agencies.

People Who Drive on the Job.—

Responsibility for protecting the millions of workers whose "workplace" is a road vehicle is vested primarily in the Department of Transportation, which has given little attention to truck occupant protection.⁸ The few existing standards for heavy trucks were established years after comparable standards were set for passenger cars. Important areas that have been completely neglected include the design of the truck steering wheel (the first structure likely to receive the impact of a truck driver in a frontal collision), even though abdominal injuries repeatedly have been shown to be especially common in injured truck drivers.⁹

Research has shown that seat belts, when used, substantially reduce deaths and severe injuries to automobile occupants. Yet OSHA has not promulgated regulations to require their use in company-owned cars, and most employers, including governmental agencies, either do not require or do not enforce seat belt use. In addition, many workers whose jobs require driving automobiles are now being subjected to increased risk as their employers purchase smaller vehicles, which offer substantially less crash protection.¹⁰ The switch to fleets of smaller cars—a change that could double a worker's likelihood of being killed in a job-related crash—has few if any counterparts outside the transportation system. In illustration, it seems unlikely that arguments related to cost or limited resources (counterparts to "fuel economy" arguments) would be considered valid justification for doubling a worker's likelihood of death due to a carcinoma or fixed machinery.

Pilots.—The Federal Aviation Administration sets occupant protection

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standards for civilian aircraft. Standards specifying the forces against which pilots and passengers must be protected have not been upgraded from minimal standards established 36 years ago.¹¹ Underscoring the potential benefit that could be realized through improved occupant protection, more than half of all general aviation (noncommercial, nonmilitary) aircraft can be expected to crash during a 20-year "lifetime." About 15% of the reported general aviation crashes result in fatalities; many of these crashes occur at speeds and under circumstances that would permit survival with state-of-the-art design changes.¹²

Farmers.—Nationally, the number of work injury deaths among farm workers (about 1,900 annually) is exceeded only by the number among construction workers; about half of the farm-work-related deaths involve tractors.¹³ No federal safety standards apply to the manufacture of nonroad land vehicles such as tractors. Although OSHA regulations require that equipment provided to employees have specified safety features (eg, tractors with rollover protection), OSHA inspects only those farms or businesses that have ten or more nonfamily employees. In many parts of the country, such farms are the exception rather than the rule. As a result, tractors without rollover protection can legally be sold, are in common use among people working on farms, and are frequently involved in deaths and serious injuries.

Persons at High Risk of Being Assaulted.—These include police officers, taxi drivers, and storekeepers. Technically, the "general duty" clause of the OSHA Act, which requires employers to provide workers with a safe workplace, applies in the case of employees who are at risk of being shot or otherwise assaulted on the job. Yet, no OSHA standards address this increasingly important problem. Standards requiring bulletproof partitions, vests, helmets, or other protection for especially high-risk employees¹⁴ would be comparable with many existing OSHA standards relevant to nonassaultive injuries.

In summary, OSHA cannot set vehicle standards for occupant protection in transportation vehicles, has not set standards pertaining to

assaultive injuries, and does not apply to self-employed workers. Collectively, 53% of the workers in the study were occupants of transportation vehicles, or were assaulted, and/or were self-employed.

Need to Apply Preventive Principles

Because of the diversity of circumstances under which occupational injuries and deaths occur, it is essential that injury control be given priority when jobs and work equipment are designed. The overwhelming majority of fatal work injuries, about 80%, result from mechanical energy applied to the body in doses that exceed human thresholds. Other types of energy—primarily thermal and electrical—cause most of the remainder. Yet these injurious energy exchanges and the basic strategies for preventing them are not understood and applied by many employers, designers, manufacturers, architects, and others whose decisions determine the likelihood of injury for thousands of people.^{15,16}

The principles of automatic ("passive") protection, ergonomics (human engineering), and fail-safe backup protection often are not adequately applied in the workplace. An exception is the guarding of much fixed machinery so that workers' limbs, hair, and clothing cannot be entangled. Such automatic protection is of proved effectiveness. For example, injuries from power presses in England decreased by 70% during the first eight years that effective machine guarding was required.¹⁷ Reflecting the decades of attention to machine guarding, only 8% of all deaths in our series involved fixed machinery. In contrast, three fourths occurred outdoors, where automatic protection is least common. In many hazardous outdoor jobs, such as logging, supervision is minimal and compliance with recommended "safety practices" is inadequate, making automatic protection especially crucial.¹⁸

By changing the design of products that are used under many conditions or by a wide variety of industries, the risk of injury could be substantially reduced for workers who are currently required to undertake especially hazardous tasks. For example, "a par-

ticularly serious hazard in inflating truck tires is the possibility that the locking ring may blow off at high pressure." More than 350 tire explosions involving multipiece wheels were recently reported.¹⁹ Neither "safety cages" (to restrain objects propelled by the explosion) nor worker training programs have proved to be reliable means of preventing these injuries and deaths. Some large companies have reduced the problem by equipping their truck fleets with single-piece wheels. The most widely effective countermeasure would be to abandon manufacture of multipiece truck wheels. In addition, inflation systems should have fail-safe devices to prevent the buildup of potentially disastrous tire pressures. Two tires in our series, designed for maximum tire pressures of 25 and 35 psi, were being inflated by compressors designed not to shut off automatically until the pressure exceeded 130 and 150 psi, respectively.

Overreliance on Worker Infallibility

Some form of "human failure" occurs from time to time in virtually any job. Whether it results in serious injury or death depends on how the job and the equipment are designed. Cranes, for example, and truck booms²⁰ cause electrocutions when they touch overhead wires. Preventive procedures required by OSHA include deenergizing electric lines, interposing insulating barriers, or maintaining a 3-m distance between boom and wires.²¹ The success of these measures depends on worker cooperation. In tasks such as this, where human error carries a substantial risk of death, greater priority must be given to systems that protect automatically. For example, the detectors used in proximity warning devices, which give an audible signal when the boom comes within a specified distance of an electric line, could also be used in a system that actually stops the boom from moving closer to the wires.

Insufficiency of Data

The scientific investigation of occupational injuries and deaths is difficult not only because there is no single complete source for readily identifying cases, but also because

important data are commonly absent. Injured workers, for example, are not generally tested for BACs, and in many jurisdictions, alcohol tests are not routine even for fatalities. This study is the first, to our knowledge, to provide information on alcohol concentrations in a large series of fatally injured workers. Our data for Maryland work fatalities suggest that high BACs are most common among workers killed by vehicles (road or non-road). Unlike most alcohol-related, nonwork crashes, which occur preponderantly at night and on weekends, alcohol-related work fatalities tended to occur in the daytime and early in the week (although not on Monday morning). Among cases positive for alcohol, the BACs in Maryland workers (median, 0.09% by weight) were substantially lower than those in a large series of drivers killed in Maryland (median, 0.16%).¹⁸

Other data that could play a crucial role in understanding work injuries and developing preventive measures are never collected. The make and model of nonroad land vehicles are important examples. The usefulness of such data has been demonstrated by the identification of problems specific to certain road vehicles (for example, rollover tendencies of certain vehicles¹⁹), made possible by the routine recording of data on the make and model of each vehicle involved in a crash. Comparable information is not recorded for tractors, forklifts, cranes, and similar equipment. In fact, in our investigation, it was sometimes necessary to read reports from several agencies before it could even be determined whether the equipment being used was a backhoe, for example, or a tractor. The rollover tendencies of these nonroad vehicles are crucial, and knowledge of the involvement rates of various makes and models may help to develop preventive measures.

Noncivilian Deaths

Statistics on occupational injuries and deaths generally apply to the civilian population only. Because denominator data are not readily available for military personnel, it is tempting to exclude them from a series of cases, especially in a study such as this for a single state. Exclusion of such cases from all state-

based studies, however, would result in a needless loss of valuable information. The definition of "cases" in this series (ie, died in 1978 of injuries incurred in Maryland) does not allow their exclusion, except when calculating rates based on the civilian population. Moreover, details of some events involving servicemen, such as the crash of the Coast Guard cutter,²⁰ provide useful insight into comparable civilian problems.

Groups With High Death Rates

The notion that certain jobs are "high-risk jobs" can easily become a self-fulfilling prophecy or foster complacency. "It's all in the day's work," as the huntsman said when the lion ate him" (Charles Kingsley, 1855). Clearly, however, groups of workers deserve special attention if their service to the rest of the population places them at especially high risk of death or severe injury. Taxi drivers, for example, are at special risk both because they offer tempting targets for armed robbers and because they spend their working hours exposed to, and inadequately protected from, the kinetic energy of crashes. In Maryland, the five deaths among taxi drivers (three shot, two killed in crashes) represent a rate of about 80 per 100,000 workers, more than ten times the average for all civilian workers. In addition to trying to understand and explain the high death rates for such groups, epidemiologists and health professionals must help to plan, promote, and evaluate effective remedies.

This study includes many deaths, such as those among members of the military and workers who are killed in crashes or assaulted, that are not usually thought of in the context of occupational deaths. It provides details on these and other workers who were killed at work, identifies some of the contributing factors, and suggests avenues for further research. We hope our findings will encourage health professionals to take a fresh look at life-threatening work injuries and ways to prevent them.

This investigation was supported in part by the Insurance Institute for Highway Safety and the Maryland Medical-Legal Foundation.

Christine Corsey assisted with data collection and analysis. Maryland state agencies that provided data to the Office of the Chief Medical Examiner of Maryland were the Department of

Licensing and Regulation (Division of Labor and Industry), the Department of Health and Mental Hygiene (Division of Vital Records), and the State Police.

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[The following information was subsequently received for the record:]

QUESTIONS OF THE COMMITTEE AND THE ANSWERS THERETO

Question 1. You note in your testimony several areas where action needs to be taken to protect drivers from hazards. What actions do you believe could be taken quickly and effectively to improve driver safety, especially for truck drivers?

Answer. Ask NHTSA to restore the Office of Heavy Duty Vehicle Research and its funding (reduced from \$1.8 million in FY82 to \$360,000 in FY84), and charge it with making significant improvements in truck brakes and crashworthiness. Of particular importance in terms of crashworthiness are designs that will provide passive protection against the injuries inflicted by current steering wheel designs.

Require that wider trailers (i.e., wider than the 96 inch width permitted prior to the Surface Transportation Assistance Act of 1982) have appropriately greater vehicle track width. Almost half of all fatally injured occupants of heavy trucks are killed in overturns. The problem will be worsened by the recent increase in permitted trailer width to 102 inches, unless track width is increased correspondingly.

Question 2. Do you believe there is any specific action the government can take to promote seat belt use by car and truck occupants?

Answer. Enforcement of seat belt use by all occupants of all government owned vehicles is crucial. It would set an important example for the private sector. Incentives that could be tried and evaluated include loss of parking privileges or loss of use of government vehicles. Government vehicles could have bumper stickers with an 800-phone number and the message: "please call and give the license number of this vehicle if you see an occupant who is not wearing a seat belt."

Incentives to states to pass seat belt use laws should be developed, comparable to incentives for legislation to reduce drunk driving.

I wish to emphasize that there is not one shred of scientific evidence from any country in the world to suggest that use of seat belts will ever eliminate the need for better passive protection. Rather, it is clear that the people who are most likely to be in crashes tend to be the least responsive to laws and other measures designed to increase seat belt use. It is of paramount importance that increasing seat belt use in present vehicles and providing better passive protection in future vehicles should be seen as complementary to one another, rather than "either-or" alternatives.

Again, thank you for your continued interest and your efforts to reduce motor vehicle related injuries.

Senator DANFORTH. Next we have Mr. Clarence Ditlow, director of the Center for Auto Safety.

STATEMENT OF CLARENCE DITLOW III, DIRECTOR, CENTER FOR AUTO SAFETY

Mr. DITLOW. Thank you, Senator Danforth.

Senator DANFORTH. Thank you, sir.

Mr. DITLOW. I do have a full statement for the record, and I will present my abbreviated one now.

As a result of the Federal safety standards that were issued in the late 1960's and early 1970's, the cars that were produced at the end of the 1970's were a lot safer.

Senator DANFORTH. Could you speak directly into the mike?

Mr. DITLOW. Unfortunately, as cars get smaller, we are faced with safety standards becoming more and more outmoded. As a representative of a consumer group, I know consumers themselves are particularly concerned about small car safety. The biggest single change we have seen in the last 10 years is the increased number of consumers that ask us, what is the safest small car. That is, as they moved from the 4,000-pound standard car in the midseventies to the 2,500-pound compacts in the 1980's, this concern was the main reason.

Although the present administration has tried to kill and in fact has stopped publication of "The Car Book" that answered this concern, the center is going to produce it for 1983.

I would like to focus on one specific safety area that shows the impact in the 1980's. That is the side impact issue. We have a completely outmoded safety standard on the books. As cars get smaller and slower as they go through intersections, the protection is less.

The standard on the books simply requires that cars will not be crushed more than 18 inches when you apply a crush force of 7,000 pounds or twice the weight of the car, whichever is less. What this means is that for a car that weighs 2,000 pounds, you only apply a crush force of 4,000 pounds to it; whereas with a 3,500-pound car, you apply a 7,000-pound force.

The Department of Transportation and researchers recognized in 1970 that as cars got smaller, we needed to upgrade side impact protection. They pointed out particularly the problem with small cars and impacts at normal speed of 35 miles an hour.

In fact, we have available technology to strengthen the side of the car. We can use high strength, low-alloy steels. We can use foam-filled panels. We can put more padding on the B-pillars of the car which is where the door is. All this would enable cars, as the Research Safety Vehicle program documented, to withstand crashes at 35 miles an hour.

Indeed, based on this research that was done in the mid and late 1970's, the Department of Transportation issued an advanced notice of proposed rulemaking in 1979 saying we were going to change over from the outmoded side impact standard to applying a dynamic crash standard of 35 miles an hour just as you have for motor vehicle standard 208.

However, after holding an extensive hearing in 1980 and pointing out the priority of the side impact protection, the next thing we heard from the administration was a notice on July 12, 1982, terminating that rulemaking. They said that there are many questions remaining concerning the most appropriate test methodology, performance criterion levels. Many complex issues have arisen requiring considerable time to resolve.

Yet just 5 months before they issued the notice of proposed rulemaking, the agency's two top engineers said that most of the elements of the side impact program are nearing completion at this time. What really changed from 1979, when the agency said that side impact protection is a priority for the 1980's, and the engineers said they were nearing completion? The only thing I can find that has changed is not fatalities, not technology, not rulemaking, but the top appointees within the agency who have turned their backs on the need to prevent deaths on the highways of America and their statutory duty to issue motor vehicle safety standards to protect the public from unreasonable death and injury.

Indeed, I would close by quoting just a few of the many letters we have received from consumers who have experienced accidents or whose loved ones have died in accidents involving side impacts at moderate speeds.

One individual from New York wrote us that his daughter's car was struck at the right front door by a 3,000-pound car, certainly a moderate-sized car, traveling at a low speed, yet the Rabbit was

split in the middle from top to bottom, so the side was pushed in 2 feet. His observation was, the car was seemingly built without any resistance to side impact. I agree.

Another individual wrote that his 1982 Datsun was struck at the side. The door and the passenger compartment was rolled up like a piece of aluminum foil. The woman who was riding had her leg amputated below the knee.

Finally, a 1978 Toyota Corona, which is a compact car, was hit on the driver's side. The 16-year-old daughter was ejected. She has been in a coma ever since the crash.

It is not coincidental that of the three cars I cited, all of them are foreign compact cars. In view of this and their demonstrated higher fatality rates on the highways, the Department of Transportation could not only solve an advanced safety program, but it would help the domestic manufacturers who by and large have done better in side impact protection.

But we need to do more, not less, in the future.

Thank you.

Senator DANFORTH. Do you have an estimate of what the cost would be of improving side impact protection to the degree which you think would be advisable?

Mr. DITLOW. Senator Danforth, certainly the cost would be less than \$100 per vehicle. We are talking about one-third of all occupant fatalities. So we are talking about a big payoff for a small investment.

Senator DANFORTH. I guess one of the arguments that would be made by those who would oppose most safety standards is that they are costly, that the auto industry is now in a very serious recession, and that there is a problem of sticker shock. If you add \$100 here, and \$30 for the windshield, and x number of dollars for airbags, and so on, you could run the cost up to maybe \$1,000 a car. The market for the cars would decline, and we would just have more and more people out of work.

Do you have any thoughts on that? How would you respond to that?

Mr. DITLOW. First of all, when we hear estimates like \$1,000 from the auto companies to upgrade safety, that is out of line. The vast majority of the safety features we are talking about are in the range of \$100 to perhaps \$300. At that price range, you are not going to see a sales depression. In fact, if you look at what the American public is saying in public opinion polls, \$300 to save 20,000 lives, when you put all these measures together, is a bargain at that price.

Senator DANFORTH. Do you agree with the notion that safety does not sell?

Mr. DITLOW. Absolutely not. The only demonstrable safety program where manufacturers went out and pushed safety is what Ford did in the 1950's. In fact, the safety features that Ford offered at that time, safety belts and padded dashes, sold faster than any options Ford had ever introduced.

In addition, if we look at the late 1970's, there are a couple of examples, like the Ford Pinto, with its defective gas tank. When those cars were put on the road, the sales went down because the people were so concerned about the poor safety of cars.

If we now simply took advantage of the safety ratings, as General Motors is beginning to do in some of their advertisements, you will see once again that safety can sell.

Senator DANFORTH. I suppose one position the administration takes or has taken reflects discussions and testimony from the Secretary of Transportation. I believe that she has shown a real interest in safety, but I think that one of the points that has been made in the past, and that maybe is still made today, is that it is sufficient for Federal safety agencies to have a cooperative effort with the industry, in this case the auto industry, and that by working together, we can avoid the heavy regulatory emphasis of the past, and that reasonable people in Government and industry can work this out to a mutually satisfactory conclusion.

Is that a reasonable position today?

Mr. DITLOW. I do not believe so. If you look at the history of the automotive industry, the voluntary programs have not worked in the past. The thing that is most disappointing about this administration is, if voluntary safety programs would work, then you should have a maximum program for consumer information so the consumers could put their dollars up front to buy safer automobiles. The administration will not tell the American public what are the safer cars.

When they are cutting back on "The Car Book", and the way they fail to report crashes in understandable form for consumers, then any effort to push safety on a voluntary basis has to fail. You cannot sell what you are not trying to market. Nobody is trying to market any safety these days.

Senator DANFORTH. Thank you very much.

Mr. DITLOW. Thank you, sir.

[The statement follows:]

STATEMENT OF CLARENCE M. DITLOW III, DIRECTOR, CENTER FOR AUTO SAFETY

Mr. Chairman and members of the Committee, thank you for the invitation to testify on occupant protection in motor vehicles. I am the Executive Director of the Center for Auto Safety, a nonprofit consumer group founded by Ralph Nader and Consumers Union in 1970 but independent of both since 1972.

In 1966, an uprising of public concern over soaring vehicle fatalities led to a historic public safety program—Congressional authorization for vehicle safety standards mandated by the Department of Transportation (DOT). Subsequent mandatory safety features were a major success in reducing the highway casualty epidemic. In October 1981, DOT estimated that "a 1980 car is at least 25 percent safer than a mid-1960's one, [thereby resulting in] saving over 73,000 lives since 1966—or about 10,000 per year today."¹

The 1980's once again present the spectre of soaring deaths on the highways. The original vehicle safety standards never anticipated the tremendous influx of small cars weighing 2,000 pounds or less. With the last significant revision being the gas tank standard in 1976, the safety standards are rapidly becoming outmoded. Unless new safety measures are adopted to meet the safety hazards of small cars, DOT projects traffic fatalities will increase by 19,000 to an annual total of 70,000 in 1990.²

Consumers are particularly concerned about small car safety. The biggest single change in consumer concern over the past 10 years is the increased number of consumers who ask what is the safest small car as they move from the 4,500 pound

¹ Traffic Safety Trends and Forecasts. Similarly, a General Accounting Office Report, "Effectiveness, Benefits, and Costs of Federal Safety Standards for Protection of Car Occupants," issued in July 1976, estimated that vehicle safety improvements introduced from 1966 to 1970 had resulted in saving approximately 28,230 lives.

² Traffic Safety Trends and Forecasts at 3.

standard car of the mid-1970's to the 2,500 pound compact of the 1980's. This concern over safety was a main reason why *The Car Book* put out by the Department of Transportation in 1980 was the most popular government publication ever with over 1.5 million copies distributed. Although the Reagan Administration has tried to kill this popular consumer publication, the Center is pleased to announce at these hearings that it will once again cooperate with Jack Gillis in continuing to have this vital consumer information published in a 1983 *Car Book*.

SIDE IMPACT PROTECTION

Outside of the need for passive restraints, the area in vehicle occupant protection that most needs upgrading is side impact protection. Fully one-third of all occupant fatalities occur in side impacts. And the fatality rate can only get worse as cars get smaller.

The minimal occupant side impact protection provided by Federal Motor Vehicle Safety Standard (FMVSS) 214 is seriously degraded as cars get smaller and lighter to improve fuel economy. This is due to the fact that door strength or "peak crush resistance" depends upon vehicle weight as follows:

"The peak crush resistance shall not be less than two times the crush weight of the vehicle or 7,000 pounds, whichever is less." (FMVSS 214 § 3.3.)

Under FMVSS 214, a 2,500 pound compact car is required to resist a force of only 5,000 pounds in side crushes of 18 inches while any car over 3,500 pounds must resist a 7,000 pound force. A subcompact weighing only 1,750 pounds need only resist a peak crush force of 3,500 pounds. Thus as cars get lighter and more in need of side impact protection, the protection gets poorer under the present standard.

By the mid-1970's safety researchers realized that FMVSS 214 was not adequate for small car protection and that new safety measures would have to be implemented as more small cars came on the road in the future. Calspan Corporation, a DOT and auto industry contractor, observed in 1973:

"[R]esults of the experimental side collisions tended to verify the expected inferior crashworthiness offered by compact and subcompact automobiles. . . . It is clear that conventional automobile design improvements are needed to provide adequate moderate impact speeds near 30 mph, and the need for effective protection becomes more acute for small size automobiles."³

Research by the mid-to-late 1970's demonstrated that side impact crashworthiness of cars could be significantly improved with known technology. DOT's Research Safety Vehicle (RSV) program clearly demonstrated that survivable side impact velocities could be increased from about 12 mph to over 30 mph for subcompact vehicles.

Calspan in its RSV work found that addition of reinforcements, increased sheet metal gauge, and substitution of high strength low alloy steel for mild steel in a 2,600 pound car would provide occupant protection in 40-45 mph side impacts.⁴ Both Minicars and Calspan found that filling side panels and doors with foam would reduce side impact intrusion to less than 6 inches in 30+ mph side impacts.⁵

Side impact protection could also be significantly improved by the use of additional padding on doors and roof pillars and laminated side windows to absorb energy and prevent ejection in second collisions of occupants with the vehicle interior after the first collision of the vehicle with another vehicle or a fixed object. Once again, there is a large body of fully documented research ranging from government contractors to the auto companies themselves.⁶

Based on the clear need for improved side impact protection and the demonstrated technology to accomplish the same, the Center for Auto Safety petitioned the National Highway Traffic Safety Administration (NHTSA) to upgrade FMVSS 214 on October 31, 1977. On March 31, 1978, NHTSA granted the Center's petition and engaged in work preliminary to issuing a notice of proposed rulemaking.⁷ By September 1979, NHTSA issued a comprehensive evaluation of FMVSS 214 which was followed by an advanced notice of proposed rulemaking on December 6, 1979, to upgrade the standard.⁸ In early 1980, NHTSA held a two-day conference on side

³ J. E. Green, "Basic Research in Crashworthiness II—Side Impact Test of Unmodified Vehicles" 84 (Feb. 1973).

⁴ "Design, Development and Testing of Calspan/Chrysler Research Safety Vehicle—Phase II" Vol. 1, p. 3-54, 56 (Feb. 1977).

⁵ R.B. Tanner, "Crashworthiness of the Subcompact Vehicle" 4.1, 17 (1975).

⁶ E.g., J.E. Greene, "Occupant Survivability in Lateral Collisions" (1976).

⁷ Copies are submitted for the hearing record.

⁸ 44 Fed. Reg. 70204, a copy of which is submitted for the hearing record.

impact protection and announced that it would issue a notice of proposed rulemaking by 1981 with a final rule to be effective by 1984. The new side impact rule would have been modeled after FMVSS 208 by requiring a 30 mph dynamic side crash with instrumented dummies meeting specified injury criteria. Such a rule would have been a vast improvement in requiring occupant protection under conditions closely resembling real world crashes.

Instead of issuing the Notice of Proposed Rulemaking as promised, NHTSA terminated the rulemaking on July 12, 1982. The terse explanation given by NHTSA was research "demonstrated that there are many questions remaining concerning the most appropriate test methodology and performance criteria and levels. Many complex issues have arisen which will require considerable time to resolve."⁹

Yet five months earlier, NHTSA's two top engineers gave a distinctly different view in a Society of Automotive Engineers paper which concluded:

"[T]he NHTSA side impact program . . . has led to the development of a new deformable barrier which can be used to simulate car-to-car collisions, the development of at least two dummies with special design features for use in side impact testing. . . . *Most of these elements of the program are nearing completion at this time. . . . Performance criteria and dummy measurement capability of abdominal injury are under development.*" (Emphasis added.)¹⁰

What has really changed in three years since NHTSA called:

"The improvement of side impact protection a top priority of the agency . . . because over 34,000 vehicle occupants lose their lives annually in highway accidents and approximately one-third of these fatalities occur side impact collisions."¹¹

Only the agency's political appointees who have turned their backs on preventable deaths on the highways of America and their statutory duty to issue new motor vehicle safety standards that protect the public from the unreasonable risk of death and injury in automobile accidents.

All the while NHTSA delays in requiring improved side impact standards, more people will die as more small cars with less side impact protection enter America's highways. Perhaps if the NHTSA political appointees had to face side impact victims and tell them they were withholding known technology that could have protected them and their loved ones, these coldblooded political appointees will remember their ignored mandate to improve vehicle safety.

In the hope, NHTSA officials will hear the personal tragedy, I will close by quoting from some of the many victims of poor side impact protection.

"My daughter's car was struck . . . at the right front door . . . by a Plymouth weighing about 3,000 pounds, traveling at a low speed. The VW Rabbit was bent in the middle from bottom to top, from carriage to roof, so that the side was pushed in approximately two feet. It seems the car was built without resistance to take any side impact." (A. Toker of New York.)

"The Chevrolet struck the passenger side of the [1982] Datsun [so] that the door and passenger compartment . . . was rolled up like a piece of aluminum foil. . . . Mrs. Richard's right leg [was] amputated below the knee." (G. Becker of Tell City, IN.)

"[A] 1978 Toyota Corona . . . was hit on the driver's side. . . . 16 year old daughter was ejected . . . and has been in a coma since the accident occurred [almost a year ago]." (P. Murphy)

[The following information was subsequently received for the record:]

QUESTIONS OF THE MAJORITY AND THE ANSWERS THERETO

Question 1. In your testimony you stated that technology is available to strengthen side impact protection in cars. Yet instead of requiring that this technology be incorporated into cars, NHTSA has embarked on a cooperative research program with the automobile manufacturers. Do you believe any further research in this area is really needed? What should be done to improve side impact protection?

Answer. Further research is not necessary to substantially upgrade the side impact protection of cars as existing technology is available to be incorporated immediately. What needs to be done is to put the technology into the cars Americans drive. While more sophisticated test techniques could be developed to measure side

⁹ 47 Fed. Reg. 30084.

¹⁰ SAE Paper No. 820245, "The Role of the Side of the Motor Vehicle in Crash Protection" (Feb. 1982), a copy of which is submitted for the record.

¹¹ 44 Fed. Reg. 70204 (Dec. 6, 1979).

impact protection, there is no need to be paralyzed by a search for the perfect test method and equipment. Simply increasing the static force applied in the present test method would require the car companies to strengthen the side impact protection of cars in a measureable fashion.

Question 2. Advanced safety technology has been developed but, for the most part, is not incorporated into the vehicles available to the American car buyer. Among the reasons given for this are the high cost of some of this technology and the unwillingness of consumers to pay this high price. To what extent should cost and public acceptance of safety technology be considered in promulgating motor vehicle safety standards?

Answer. Cost of safety technology is already considered in the requirement that safety standards be feasible and practicable. A device that would raise the price of a car by 50 percent would clearly not be practicable. However, safety technology that raised the price of a car by 1 percent and save a 1,000 lives annually would clearly be practicable. To further require or define cost criteria in setting safety standard would be unreasonable. Moreover, it could well handicap new technology which becomes vastly cheaper over time as the cost of development is written off and the manufacturer goes up the learning curve in making the technology cheaper. An excellent example is the 5 MPH bumper used on 1982 model cars which is clearly cheaper and lighter than the ones first used in the mid-1970's.

Just as cost is built into practicable so is public acceptance built into feasible. To further build public acceptance into the safety act is unnecessary and could well delay the development of needed safety standards as public opinion surveys would undoubtedly be urged by the auto companies. As a practical matter, the safety agency has long expressed a preference for safety standards that rely on passive or automatic protection such as laminated windshield and collapsible steering columns.

Senator DANFORTH. Next is Donald Friedman, president of MCR Technology.

STATEMENT OF DONALD FRIEDMAN, PRESIDENT, MCR TECHNOLOGY

Mr. FRIEDMAN. Senator Danforth, our company has been working since 1968 on the hypothesis that providing and using occupant restraints is the best and most cost effective means of the satisfying legislative mandate to save lives and reduce injuries.

MCR Technology is the company that in 1974, after analyzing the available accident data and identifying the vehicle modifications that could be developed to substantially reduce casualties, won the competition to prove it by designing the research safety vehicle. The performance of that vehicle was identified in the film clips that Mr. Kelley showed you earlier. And I believe that the National Highway Traffic Safety Administration will have the vehicle here for you to inspect tomorrow.

I believe the RSV program demonstrated in tests conducted by independent governments and automotive companies worldwide the maximum degree to which the victims of automobile accidents could be protected. It is true the Germans complained it did not handle as well as a Porsche, and several auto companies pointed that it was not production engineered. Of course, it was not supposed to be, it is a prototype. But no one challenged the technical feasibility of producing it. Neither is there any doubt that the technical subsystems such as the airbags could be fitted into standard production cars.

I need to point out, however, that MCR Technology, formerly Minicars, is an R&D company and as such is not political. Research costs money, and our efforts since inception have been supported by the Department of Transportation.

The extent of that support is dependent upon the resources available to the agency, the focus of their interest, our ideas supporting their interest, and our ability to compete for programs.

The testimony that I submitted in writing, which I would like to enter into the record in its entirety, is in part a result of the limited support we have been recently receiving from NHTSA, in part an interpretation of the paper entitled "A Search For Priorities in Crash Protection," presented by NHTSA last year at the SAE meeting; but it is mostly research that we have been proposing as an alternative to providing and using occupant restraints.

I urge you to recognize that the value of this alternative research, even while the occupant restraint debate rages, because a collision avoidance, RSV, which is what might be called a generic term for what I am talking about, adequately supported has the potential to save three-quarters of the injuries and fatalities of the original RSV. Basically, the idea is to provide aids which will assist drivers in reducing the severity of an accident.

Now, some 20 different techniques are listed on pages 3 and 4 of my testimony, but let me give you an example. About 40 percent of all accidents involve some kind of braking, but it takes about seven-tenths of a second to move your foot from the accelerator to the brake pedal. A brake pedal integrated into the accelerator would eliminate a big portion of that seven-tenths of a second, which is a delay experienced by people who are having accidents, and it would reduce the velocity of the impact by some 20 percent. That is very significant in reducing the severity of the accident.

What has been going on in the past when one speaks of collision avoidance techniques is counting the number of accidents which are altogether avoided and ignoring the reduction in injuries or fatalities which will result from mitigating the consequences of a collision—that is, by reducing the velocity, for example. Let me give you another example.

About 50 percent of the accidents we have in this country are alcohol related. For a few dollars we can provide an instrument which remembers how you normally drive, and when you are not driving alertly can give you an indication of that. That is not to say that anybody is going to do anything about it after getting that indication, but it is an effective means of alerting the driver to the character of his driving which is less than appropriate.

The written material also mentions a wide variety of devices, many of which only need illustration and implementation. For example, several countries have experimented with headlights on during the daytime and experienced a reduction in the number of accidents. They did not have the technology to estimate in the same circumstances the reduction in the severity of the accidents that did occur. So in comparing the benefits, they only counted the number of accidents that were avoided, not reduction in harm that was accompanying the use of that technique.

Now, also I need to mention that there is much that can be done to reduce the severity of an accident in a crash within the car that is not associated with just the idea of air bags or seat belt safety harnesses. For instance, in the RSV we have a quantity of padding as a contact surface in the inside of the door. That padding in no way interferes with the comfort of the driver. What it does basic-

ly is close the gap between the side of the door and the occupant's shoulders. By properly contouring that surface and by providing the kind of energy absorption possible in the padding, the padding can reduce the severity of a side impact.

In the current program that we are working on for NHTSA, we have modified the door support structure of a Chevrolet Citation, with 6 pounds of steel, and with padding similar to the kind we used in the RSV, and obtained a 25-percent reduction in the velocity of the door striking of the occupant. But there is always a question of what does that mean. Indications are that it would be more than a reduction of two levels of injury severity in any accident of that type.

Now, in summary, I would like to urge you to see that proven devices and techniques are implemented, but also that alternative research continues so that we can in fact reduce the carnage of our vehicle accidents.

Thank you.

Senator DANFORTH. Thank you, Mr. Friedman.

You have worked in this area for some time. As you said in your concluding statement, there is always a need for more research and more pioneering in this field. Looking at the research that has already been conducted by your firm and by others in the development of the research safety vehicle, what is the extent of the present gap between known safety technology and what is actually present in automobiles?

How would you describe that? Are we using all we know right now? Are we building cars as safely as our research has told us we can, or is there a gap?

Mr. FRIEDMAN. There is a tremendous gap, not in terms of the availability of the technology or the knowledge of the people in the industry. I think there is adequate indication that we are all together in knowing what we could do. There is, however, a substantial gap in the question of what is being done.

As I was trying to say, as a researcher there is a large area of judgment here as to why the industry is not implementing some of the things that have been developed. Once developed it is very difficult for me to understand what factors exist in the marketplace that preclude their implementation.

I was with General Motors for some 10 years myself, and my area of expertise at General Motors was in small car safety. It was, however, at a time when small cars, even in General Motors, were not popular. My reaction basically is that it is a marketplace decision, and there is no mechanism for the marketplace to express itself to the manufacturers.

I think also that there is a responsibility that the Government has to provide the information to the marketplace so as to create a market for the manufacturers. The Government has a rather extensive program, which has been mentioned a couple of times, to assess the safety performance of new cars in accidents, in crashes of about 35 miles an hour, 5 miles an hour above the previous FMVSS-208 standard.

I wonder if everybody realizes those crashes are conducted with occupants who are seat-belted; that is, the dummies are belted in place with the existing restraints and then subjected to the crash.

The consequences of that program have been substantial; that is, the exposure to the public of the difference between the results in one car and the results in other cars have caused manufacturers to make sure that in public relations releases from the Government they do not look bad.

Keeping in mind that probably 90 percent of our public are unrestrained in cars, it would seem to me that probably the single most important thing the agency could do to encourage the manufacturers to improve the safety of their vehicles would be to run the new car assessment program with unrestrained dummies. It may be that one needs to do it at a lower velocity. It may mean that all of the dummies would be killed in a 30-mile an hour collision, and only 20 miles an hour is possible now.

The problem is we are telling the public that this car is better than that one if you wear your seatbelts, but most of our public are not wearing seatbelts at all. I think that is the kind of thing that could be done to encourage the manufacturers to do what they should do.

Senator DANFORTH. Again, on the question of the gap between what we know now and what we have actually incorporated in automobiles, do you have any idea as to how much additional it would cost to transform today's cars into significantly safer cars using the technology that we have available?

Mr. FRIEDMAN. Well, I think there is the big question of what the word "significant" means. Let me give you another example. The agency has developed a device called the high-mounted rear stop-light. It is a single brake light that is mounted in the center of the rear window of an automobile, and this program has been going on for about 10 years. In the last 3 years there have been a number of fleet tests of this device. It is a very simple device. The brakes go on, the light goes on in the center high in the rear window; and they have had a 53 to 54 percent reduction in the number of accidents, without even counting the mitigation of the accidents that did occur.

Now, it seems to me that when one has such a controlled test, and that light probably costs \$2 or it may be \$10 installed or some ridiculously small figure, you can see that there is a way of making a substantial improvement for a very nominal expense.

The very idea of that device is very much like the other devices I mentioned; that is, they are characteristic of the way the industry goes about doing things. They add things that cost a few dollars and make a very small improvement.

To accomplish your total objective I think is a much more significant kind of thing, but I would certainly agree with Clarence that it is under \$1,000 to make a substantial improvement. That does not mean we would eliminate the 27,000 fatalities we have and the 2 million injuries, but it could have a significant effect in reducing those numbers, perhaps by 30 percent. Even if the RSV technology were implemented in cars, manufacturers have estimated a 30-percent increase in the price of the automobile. If they had applied all of the technology that was inherent in the RSV, their position was that it would increase the cost of the automobile by 30 percent. But they also have to admit, or agree essentially, that it would reduce both fatalities and injuries by 75 percent.

Now, that is a big number. Then we are talking about 20,000 fatalities and a million and a half injuries each year. Those are very big numbers.

I am not saying that one needs to do that. What we are demonstrating in the RSV program is, "Here is as much as you could do with crashworthiness." Whether one wants to make that kind of investment in all cars, that is a different question; but that gives you an idea of the range from \$2 to 30 percent of the cost of automobiles.

Senator DANFORTH. In your view, are industry estimates of the costs of installing safety devices of one kind or another usually pretty accurate? Should we accept those at face value?

Mr. FRIEDMAN. I think you can accept at face value those that are provided as a result of a confidential request on the part of the agency. When the question of airbags was under investigation, the agency essentially subpoenaed or asked for detailed cost estimates of the cost of airbags. There was not a wide disparity between the estimates of the agency and those of the manufacturers.

The agency was saying that the airbag's cost of installation was on the order of \$110, I believe, and the manufacturers were saying that they had a cost estimate of perhaps \$160 or \$170.

My point of view is that, of course, when you listen to the rhetoric, it is \$700. That comes about by asking the question differently. If you install 1,000 units, how much are they going to cost as compared to 10,000 or 100,000 or 10 million? Each quantity results in different cost numbers.

So I would say that you can obtain an accurate estimate if you ask the right question and if you had an alternate source for comparison.

Senator DANFORTH. It is not your view—or is it your view that the industry tends to overstate the cost of these devices? Do they tend to answer a straightforward question with an answer which would apply to what would be the cost of a single airbag as opposed to mass-produced?

Mr. FRIEDMAN. I think the industry contains—a lot of my associates are in the industry, and they are honorable people. I think very often, though, the estimates are based on a different quantity of production or a different scope of performance than is recognized by the people who do the asking.

So if you wanted to find out what the comparison would be, you would have to ask a knowledgeable question. Otherwise, you do tend to get a justification, and that is inevitable, I guess, in some way or another.

Senator DANFORTH. A justification of what?

Mr. FRIEDMAN. Whatever the company position happens to be.

Senator DANFORTH. Thank you very much, Mr. Friedman.

Mr. FRIEDMAN. Thank you.

[The statement follows:]

STATEMENT OF DONALD FRIEDMAN, PRESIDENT, MCR TECHNOLOGY, INC.

Chairman John C. Danforth and honorable members of the subcommittee: Our company has been working since 1968 on the hypothesis that "providing and using" occupant restraints is the best and most cost effective means of satisfying the legislative mandate to save lives and reduce injury.

MCR Technology is the company who in 1974, after analyzing the available accident data and identifying the vehicular modifications which could be developed to substantially reduce casualties, won the competition to prove it by designing the Research Safety Vehicle. The performance of that vehicle is identified in this one minute public service film clip.

Through improved crashworthiness the RSV program "demonstrated the maximum degree to which the victims of auto accidents could be protected cost effectively."

But, we underestimated the regulatory and public pressure which would be required for manufacturers to incorporate that technology into production vehicles. When this became apparent in 1980, a new strategy was developed. This new strategy has as its primary focus, recognition of the automotive industry's capital intensive need to effect change in an evolutionary, not revolutionary, fashion; and has as its goal, the near-term reduction of casualties.

And last year the implementation of passive restraints was rescinded, or at least delayed because expectations were that usage was unlikely to increase. Hence, most auto occupants will be unrestrained.

Now as far as I can tell, without restraints, the likelihood of improved crashworthiness reducing casualties in high speed collisions where most of the fatalities occur, is remote. It turns out however that a large part of the total cost of accident trauma is contributed by the very large numbers of non-life-threatening injuries in relatively low speed collisions. And these are amendable to mitigation by very low cost countermeasures. This film clip is an example of a 30 mph unrestrained occupant crash.

But, to minimize fatalities we must look for means of avoiding or averting the high speed collision, or mitigating its consequences.

It is my impression that, in light of these factors NHTSA's research and development activity for the past eighteen months has been reassessing the priorities to be used in allocating its inappropriately diminished resources for crash protection and prevention.

The following is an overview of my understanding of how much can be done to reduce harm:

Simplistically stated (with rough numbers), the accident files indicate that:

(1) Half the harm occurs at Delta V's less than 35 mph in frontal and less than 20 mph in side impacts and can be mitigated by interior contact modification. This is a film clip of such a side impact.

(2) Half the harm to vehicle occupants occurs at delta V's greater than 35 mph in frontal and 20 mph in side impacts and can only be mitigated by: (a) reducing the delta V of the collision, (b) shifting to a less injurious direction of impact force.

These two harm mitigation categories are roughly the respective responsibility of NHTSA's Crashworthiness and Crash Avoidance Research Divisions. Prioritization efforts should start with the accident files and assess the harm reduction potential of conceptualized countermeasures (to be discussed later). The following two slides illustrate:

(1) The potential for harm reduction by Crashworthiness is about 25 percent, assuming a reduction of one AIS level in each injury below 35 mph delta V.

(2) A 10 mph reduction in delta V reduces harm by about 25 percent (see Figure 1), and a 30 degree shift in the direction of impact force reduces harm by about 35 percent (see Figure 2). The combination has a 50 percent total potential for harm reduction by Crash Avoidance.

However, it is important to note that implemented in combination, the possible reduction in harm is guesstimated at 60 percent, contributed 25-45 percent by crash avoidance and 15-25 percent by crashworthiness.

There is, therefore, a need for prioritization of crashworthiness and crash prevention harm reduction potential:

(1) Quantification of the harm reduction potential and the cost of collision avoidance and mitigation countermeasures.

(2) Prioritizing alternative crashworthiness and crash prevention countermeasures which must compete with each other for harm reduction potential at lowest cost.

Some of the high potential countermeasures we are researching or which need to be researched to improve occupant safety are:

CRASHWORTHINESS—OCCUPANT PROTECTION COUNTERMEASURES

(1) Assist with the driver and passenger station injury problem definition, suggesting ways to obtain missing or supporting data and information, and characterize and develop cost effective countermeasures.

(2) Investigate and correlate driver abdominal injuries between accident files, human surrogates and dummy injury measurements and measures. Develop an abdominal insert with appropriate instrumentation for the Hybrid III dummy.

COLLISION AVOIDANCE COUNTERMEASURES

(1) While cars are designed for normal drivers, drivers in accidents are in one way or another, impaired. We need to conceptualize countermeasures with quantifiable harm reduction potential which will assist such drivers.

(2) We also need to identify and evaluate countermeasures for initiating braking earlier (thereby extending the interval of braking and reducing the impact delta V).

(3) Then we need to prioritize alternate countermeasures for competitive harm reduction potential, cost, retrofitability and in favor of those which improve (or do not degrade) normal driver performance in various vehicle classes.

Some nearterm specifics are:

In the crashworthiness area conduct interior and structural research to understand the injury mechanisms and develop techniques to reduce the level of injury such as: restraining collapsible steering column; compliant steering wheel rim; controlled deformation instrument panel; improved interior side impact padding; low laceration glazing and shielding (Securiflex); extensible glove box and tray; lightweight energy-absorbing front and side structure; RSV type long stroke bumpers to limit low speed injuries; and compliant pedestrian impact protective surfaces.

In the collision avoidance area, we need to understand why most drivers make no maneuver and drive straight into an impact. Research is needed to define "closed loop" driver/vehicle responsiveness when under the control of the alcohol/drug impaired driver; old driver; youthful driver; and driver who is unfamiliar with the vehicle.

Optimize driver/vehicle responsiveness when under the control of these "non-typical" drivers in non-typical environmental circumstances by developing compensating devices and adjustable response controls, such as: radar collision detection and computer discrimination; finger activated brake initiation; computer controlled dynamically stabilized braking and steering; signature sensitive alertness detector; electronic, auditory, tactile and visual stimulation; and proportional rate control steering.

The more traditional countermeasures which have been under investigation for years and whose value in some cases, has been proven in test fleets need illustration and implementation, such as: high mounted rear brake lights; daylight running lights; improved visibility; enhanced conspicuity; and tri-color lights.

These countermeasures are largely unexplored, since for the past 14 years the emphasis has been on developing and improving techniques to implement FMVSS 208. While the debate must continue as to what to do and how to proceed with restraints, I urge you to encourage doing what we can at low cost, for the majority of people who won't wear restraints.

FIGURE 1.—CUMULATIVE PERCENT DISTRIBUTION OF HARM AS A FUNCTION OF CRASH SEVERITY

Contact	Body region	Harm, percent of total	Crash severities, mph				
			10	20	30	40	50
1 Steering assembly.....	Chest.....	11.90	1	21	40	70	83
2 Steering assembly.....	Abdomen.....	9.41	1	20	50	73	88
3 Side interior surface.....	Chest.....	4.94	7	52	93	99	100
4 Windshield.....	Head and face.....	4.68	12	46	66	82	91
5 A-pillars.....	Head and face.....	4.04	7	17	54	78	92
6 Instrument panel.....	Lower extremities.....	3.43	9	44	73	90	98
7 Steering assembly.....	Head and face.....	3.13	10	50	76	91	100
8 Roof edges.....	Head and face.....	3.02	4	19	56	83	100
9 Side interior surface.....	Abdomen.....	2.36	6	37	79	85	100
10 Instrument panel.....	Chest.....	2.06	9	23	54	74	100
11 Instrument panel.....	Abdomen.....	1.85	10	17	61	84	94
12 Roof.....	Head and face.....	1.80	29	46	55	82	100
13 Instrument panel.....	Head and face.....	1.65	18	61	84	95	100
14 Instrument panel.....	Upper Extremities.....	1.40	9	32	69	90	98
15 Arm rests.....	Abdomen.....	1.25	0	36	83	100	100
16 Glove comp. area.....	Abdomen.....	1.23	0	2	48	77	85

FIGURE 1.—CUMULATIVE PERCENT DISTRIBUTION OF HARM AS A FUNCTION OF CRASH SEVERITY—
Continued

Contact	Body region	Harm, percent of total	Crash severities, mph				
			10	20	30	40	50
17 Steering assembly.....	Upper extremities.....	1.16	11	46	84	97	100
18 Mirrors.....	Head and face.....	1.08	18	76	88	100	100
19 Glove comp. area.....	Chest.....	.84	1	8	55	77	79
20 Window glass.....	Head and face.....	.79	13	46	96	98	100
21 Window frames.....	Head and face.....	.77	67	90	100	100	100
22 Front seat backs.....	Abdomen.....	.76	13	27	42	66	88
23 Side interior surface.....	Lower extremities.....	.71	10	58	94	99	100
24 Floor.....	Lower extremities.....	.69	20	51	80	86	99
25 Roof edges.....	Neck.....	.57	0	1	4	100	100
All interior contacts.....		80.26	7	34	64	83	92
All noncontact.....		7.91	9	38	62	87	94
All exterior contacts.....		11.83	12	29	57	76	86
All.....		100.00	7	34	63	82	92

FIGURE 2.—NCSS INJURY RATES BY CASE VEHICLE PRINCIPAL DIRECTION OF FORCE (PDOF)

CDC direction	Vehicles	Occupants						
		Total	AIS 2 +		AIS 3 +		Fatal	
			N	Rate	N	Rate	N	Rate
1 o'clock.....	6,620	10,331	662	6.4	325	3.1	72	0.7
2 o'clock.....	5,033	8,144	658	8.1	354	4.3	93	1.1
3 o'clock.....	661	1,027	119	11.6	63	6.1	29	2.8
4 o'clock.....	504	802	51	6.4	38	4.7	16	2.0
5 o'clock.....	452	703	29	4.1	15	2.1	3	.4
6 o'clock.....	2,490	4,379	109	2.5	35	0.8	10	.2
7 o'clock.....	616	1,006	34	3.4	15	1.5	2	.2
8 o'clock.....	825	1,376	56	4.1	41	3.0	14	1.0
9 o'clock.....	995	1,504	119	7.9	58	3.9	27	1.8
10 o'clock.....	4,643	7,583	578	7.6	333	4.4	83	1.1
11 o'clock.....	8,628	13,632	856	6.3	353	2.6	80	.6
12 o'clock.....	18,812	28,960	2,468	8.5	1,112	3.8	315	1.1
Nonhorizontal.....	2,991	4,913	626	12.7	375	7.6	143	2.9
Unknown.....	14,014	21,761	862	4.0	280	1.3	30	.1
Overall.....	67,284	106,121	7,227	6.8	3,397	3.2	917	.9

[The following information was subsequently received for the record:]

QUESTIONS OF THE COMMITTEE AND THE ANSWERS THERETO

Question 1. You state in your testimony that a large part of the total cost of accidents is contributed by the large numbers of non-life threatening injuries in relatively low-speed collisions. Do you believe that features such as more durable bumpers—5 mph or more—would help reduce this total accident cost?

Answer. In my opinion and based on the property damage analysis and design conducted in the RSV program, there is a substantial positive benefit/cost ratio for improved low speed structure, but no significant occupant injury reduction benefit. As I mentioned in other parts of my testimony, it takes a carefull understanding of the issues to properly phrase the question and to interpret the various answers. Specifically, you need to understand that the positive magnitude of the benefit/cost ratio is dependant on the design and the method of implementation.

In the past, again for what I think are marketing reasons, the industry has deliberately chosen to incorporate heavy chromium plated bumpers on hydraulic struts

all of which increase cost in comparison to the RSV plastic approach. In the last year or two however some car lines have emulated the RSV type higher benefit/cost ratio design and garnered the potential to upgrade the capability to 10 mph as demonstrated in the RSV.

Recent estimates (reference 1) are that the total cost of accidents is about \$57 billion of which about \$21 billion is property damage. A 10 mph frontal bumper capability could result in about \$6 billion in savings, while a five mph frontal bumper saves only about \$1 billion, but that is \$0.75 billion more than a 2.5 mph bumper will save. In other words, the benefits decrease far more dramatically than the costs as the impact speed capability drops.

Therefore, to me, reducing the standard to 2.5 mph doesn't make sense for two reasons: (1) The benefit/cost ratio is substantially reduced; (2) the industry was just about ready to give up the game and design a sensible lightweight plastic unit for universal applicability where the chrome isn't necessary for marketing or political reasons.

On the other hand, I must admit that I have been more focused on reducing the injuries since that represents most of the cost in accidents above 10 mph.

Question 2. The automobile industry has claimed that a vehicle occupant must be wearing a seat belt in order for an airbag to be effective. Based on your experience with the RSV, what is your opinion of this assertion?

Answer. This is an important rebuttal question which I am particularly pleased to answer. Again the answer depends on the phrasing of the question. The answer is "An air bag is effective in reducing thoracic injuries even if the seat belt is not worn, but not as effective as when the occupant's lower torso is restrained by the lower instrument panel (knee bar) and side padding as in the RSV." (There are no front seat belts in the RSV).

The knee bar and side padding are more effective than seat belts in side and rollover accidents particularly because they are passive. It is true that in normal cars, a seat belt if worn reduces ejection more effectively than padding alone. (The RSV handled this problem by carefully designed side glazing).

The padding in the RSV is far more than would be required for performance of the sort the belt mentioned by industry would provide. The claim that a belt was required countered the FMVSS 208 passivity argument by not recognizing the availability of padding.

The RSV demonstrated 50 mph frontal and 25 mph side impact performance as well as rollover capability without seat belts. The airbag alone will not protect occupants in side impact but the cost of the required padding is less than the cost of the seat belt and requires no action on the part of the occupant. It's an old argument no longer appropriate.

Senator DANFORTH. Next is Tom McGrath of the Breed Corp.

STATEMENT OF TOM McGRATH, SECRETARY-TREASURER, AUTOMOTIVE OCCUPANT PROTECTION ASSOCIATION, ACCOMPANIED BY PHILIP COLLINS, WASHINGTON COUNSEL

Mr. McGRATH. Thank you very much, Mr. Chairman.

May I have permission to have our Washington counsel, Philip Collins, here with me?

Senator DANFORTH. Of course.

Mr. McGRATH. Mr. Chairman, I also appear as the secretary-treasurer of the Automotive Occupant Protection Association.

Mr. Collins was able to have the Supreme Court permit us to file an amicus curiae in the airbag litigation now before the Supreme Court.

In response to your question of what the effect would have been if some of the safety devices had been installed in cars today, he points out in our brief that analysts have estimated that 38,724 dead Americans would have survived had their cars been equipped with airbags in the years 1975 to 1978 when 93,160 drivers and front-seat passengers were killed in crashes in the United States.

He points out in our appendix to that brief that in your home State of Missouri in those 4 years, 2,476 Missourians were killed as

front-seat passengers in the car crashes. Out of that total it is estimated that 1,063 individuals would have survived if the cars had been equipped with airbags.

Senator DANFORTH. Could you supply the subcommittee with a copy of the brief and the appendix, so we can have it for our files?

Mr. McGRATH. Yes, we will leave it here.

Several years back, Mr. Ralph Rockow (chairman of AOPA) testified that full front seat airbags would cost about \$185. I have a copy of a letter dated March 4, 1983, from Mr. Rockow to you, where he has updated on account of inflation that figure to \$208 in 1983 dollars based on 2 million vehicles.

The Breed Corp. became involved in the airbag program back about 1970. Breed has been very actively involved in military fusing for artillery shells and rockets. When the airbag issue surfaced, they saw a close analogy to the airbag sensors and military fusing in the sense that when you have a fuse, you want it to be as simple as possible.

You want it to be mass produced in large numbers. You want it to be reliable. You want it to be able to be subjected to rough handling and not fire the artillery shell or the rocket accidentally. It has to lay around for many years. When it is fired, some time after it is fired in mid-air, you want it to be armed so that when it hits the target, it will go off.

In looking at the airbag problem, Breed concluded that in the so-called second collision, an occupant is hurt when he or she collides with the windshield or the steering column at a speed of about 12 miles an hour or greater. Consequently, Breed developed a constant velocity sensor which is designed to, in essence, measure the speed of that second collision so that it will trigger an airbag at any time in a collision when the occupant is going to strike the interior of the car at 12 miles an hour or greater.

We have been active in the airbag retrofit program. We have retrofitted a 1982 Cavalier for the Insurance Institute for Highway Safety, and we do have here some of the major components of that retrofit. We were able to obtain a General Motors steering wheel with an airbag that was left over from the GM program back in 1974. We put our sensors up front in that car, and we used the inflator, that is, a German inflator presently being used on the Mercedes program, and they are here if anyone wishes to look at them.

In connection with the cost of an airbag system, that \$208 I referred to included the price of three sensors which we designed to be up front in the car. With the Mercedes system, they use an electronic sensor, a single sensor which is back in the occupant part of the car. We had an engineer over talking to them in January, and I must commend them for offering airbags, and also they are very open with airbag people who want to learn how they are doing things.

It seems to us possible to put our type of a sensor back in the occupant part of the car. In that case, we would only need one sensor instead of three, so the cost would come down correspondingly.

Senator DANFORTH. Come down to about a third?

Mr. McGRATH. Yes; I believe Mr. Rockow estimated that there would be a cost of about \$30 for sensors, diagnostic system, and wiring, so that would come down to about \$10.

Senator DANFORTH. So that would be \$20 off of the \$208?

Mr. McGRATH. That is right.

I thought that you would be interested that in connection with our retrofit activities we have responded to NITSA's request for proposals under which they intend to equip about 130 police cars in Arizona, I believe, with drivers-side airbags. We were able to obtain product liability insurance in the amount of \$1 million if we are the successful bidder, at a cost to us of \$15 a car.

Speaking of Mercedes, again, I do not have it in my prepared testimony, but we received a telephone call last week from a company in New York City which is in the business of obtaining American cars and fixing them so that they can act as police cars in mostly overseas work. They put in gun racks, and they put in the armor plating, things of that nature.

They received a call from their representative in Kuwait which contemplates buying 30 police cars. Their representative in Kuwait was quite upset because Mercedes is offering 30 police cars to Kuwait with the airbags. So the competition has begun.

I have been following the product liabilities issue with regard to Breed Corp., and it is clear to me that the products liability issue is exploding in automobile cases.

In my prepared statement, I have referred to a case that was started in Georgia recently in which the plaintiff is suing a major domestic automobile manufacturer for failure to provide automatic restraints. Apparently the plaintiff was a front seat passenger who was hurt in a collision, and she has sued the driver, I guess, for negligence, and the manufacturer for failure to provide automatic restraints.

Mr. Chairman, I voted for the Safety Act in the House in 1960. My recollection is that about 50,000 Americans were being killed back in 1966 in motor vehicle accidents. That is about the same number today, 20 years later. My guess is that but for the Safety Act, the efforts of manufacturers in improving their cars, and the 55 miles an hour national speed limit, that toll would be much higher. It is too high now, and we commend you for your efforts to improve the safety of American cars, all cars.

We look forward to a day when a buyer has the option to buy air bags if he or she wants them.

Thank you very much.

Senator DANFORTH. From the price that you cited, \$208 less \$20, does that assume every car in the manufacturer's fleet uses airbags?

Mr. McGRATH. That was based just on a volume of 2 million cars.

Senator DANFORTH. Two million throughout the United States?

Mr. McGRATH. Yes; throughout all the manufacturers. I do not think there would be too much of a difference.

Senator DANFORTH. So approximately how many cars are being sold now in the United States? Six million? Something like that?

Mr. McGRATH. That sounds right to me. But from the point of view of the sensor, we would make 2 million sensors, regardless of what kind of car it would be.

Senator DANFORTH. Is the \$208 your cost or is that the total cost to the manufacturer?

Mr. McGRATH. That is the cost to the consumer.

Senator DANFORTH. The total cost to the consumer. That includes your price for the ingredients plus the installation cost?

Mr. McGRATH. Yes, sir, profit to the manufacturer, and for the dealer, for the optional airbag. Those prices are broken down in our brief to the Supreme Court.

Senator DANFORTH. There are a lot of people who are really afraid of airbags. They think they will cause accidents, that they could go off accidentally, that it would be a frightening type of situation. We saw a movie today of a woman who was driving along, and the airbag went off. She knew it was going to go off. She did not know when. And she more or less drove right on. Did that strike you as being a realistic portrayal on the screen of real life?

Mr. McGRATH. It struck me as being realistic. I would suppose that an elderly person in bad weather at night crossing a railroad track might be a different story, but the bag goes up and comes down very quickly. As far as inadvert airbag deployment, this breed sensor is on a test program with a major automobile manufacturer, and I think it was put on about 33 cars with an airbag system. There have been two crashes we have heard about in which the bags deployed. We have not heard about any inadvertent firings in the test program. And it has gone on for about 2 years.

Senator DANFORTH. So you have no knowledge about any inadvertent action?

Mr. McGRATH. Not on that program.

Senator DANFORTH. If they are employed in an actual crash, the passenger or the driver of the car is going to have more to worry about and be upset about than the sound of the airbag going off.

Mr. McGRATH. That is true.

Senator DANFORTH. Do these protect against anything less than directly head on, like a 30-degree angle?

Mr. McGRATH. Yes; from the sensor point of view, that Federal standard could be met with a simple switch up in the front of the car. We looked at the real world crashes wherein you are not hitting a barrier and stopping immediately, where you have a very high impulse for a short period of time. You have to consider car accidents—going off the highway, going into a stand of trees, and crashing into these crash cushions that you now see, yellow barrels around abutments.

We are talking about the nature of the crash, whether you are going into a barrier or crash cushions, where the impulse is stretched out. Any time the occupant is going to hit at 12 miles an hour, you want the sensor to fire.

Senator DANFORTH. Thank you very much.

Mr. McGRATH. You are welcome, sir.

[The statement follows:]

STATEMENT OF THOMAS C. McGRATH, JR., SECRETARY/TREASURER OF AUTOMOTIVE
OCCUPANT PROTECTION ASSOCIATION

Mr. Chairman, thank you very much for the opportunity to testify this morning before your committee and its distinguished members. When the history of the airbag is written, you will undoubtedly be given the credit you deserve for pulling a laboring oar in this ongoing struggle to permit the American car buyer to select an airbag when he or she buys a new car.

I am an attorney from a small New Jersey town, Margate City, who has observed the saga of the airbag as counsel to and an officer of Breed Corporation, a small privately held research and development company in Fairfield, New Jersey. I appear here also as Secretary/Treasurer of the Automotive Occupant Protection Association.

AOPA's Chairman, Mr. Ralph Rockow of Dynamic Sciences, Inc., is unable to appear here today. That is unfortunate because he has had much more day-to-day involvement in the airbag program than I have had. Incidentally, Ralph managed the lunar descent engine for NASA's moon landing and has testified that the airbag has been more intensively tested than the lunar descent engine was.

Mr. Rockow testified before NHTSA on August 5, 1981 that the airbag cost to the consumer based on the production of airbags for 2 million vehicles would be \$185.00 (in 1980 dollars). I contacted Mr. Rockow last week and he reaffirmed that cost subject on the up-side to inflation and on the down-side to product improvements. For instance, the cost of \$30.00 for Sensors, Diagnostic System, and Wiring could be reduced if one sensor back in the passenger compartment could be used rather than two or three up forward in the crash zone. Breed Corporation is working on a new airbag system which, if successful, would use one sensor in the occupant space similar to the Mercedes system.

Breed Corporation has been involved in the conception, design, manufacture and sale of military fuses and arming devices. The logic of Breed Corp.'s early airbag efforts was simply that the airbag was going to have to be triggered by something, and what better than a well proven and tested munitions device. The Breed sensor that initiates airbag inflation is an evolutionary offspring of munitions technology that has very demanding specifications for precise circumstance-derived firing characteristics, broad spectrum infallibility, ruggedness and economically sound manufacturability. The sensing device is the critical component of the airbag system. In the past decade, the Breed Corporation has been involved in the airbag system design as well as the sensor design and development. It pioneered the computer analysis of proving ground crashes using multiple sensor math models to determine the optimum sensor response characteristic and mounting location for actual crashes. Out of this analysis came the conclusion that simple integrating accelerometer sensors set for approximately 12 MPH and located in the vehicle's front crush zone best satisfied all crash situations. Breed subsequently developed such a sensor which had been adopted for the airbag programs undertaken by Ford, Volvo, and others.

The Breed sensor (a constant velocity change sensor) has eliminated the need for matching the sensor response to the crush characteristic of different vehicles. This technical advance now makes retrofitting cars in the existing fleet (125 million vehicles) a distinct possibility. A retrofit program would initially be driver side only, which is accomplished by replacing the existing steering wheel with an airbag wheel, installing crash sensors and providing an electrical diagnostic circuit. The retrofitted vehicle appears little different than the standard vehicle. One initial advantage of a retrofit program is that it makes airbag pas-

sive restraint benefits available to the public without direct involvement of the vehicle manufacturer. The distribution and installation of these systems would be accomplished through new or existing auto service chains and/or new car dealerships. It is noteworthy that the only airbag protection being currently offered in new cars is a driver side only steering wheel unit offered by Mercedes as an option. This Mercedes airbag is a relatively expensive option and its sales have greatly exceeded the manufacturer's forecasts. In addition, the driver side only retrofit program is attractive to fleet owners because their cars tend to have a lone driver in greater proportion than the general population. Also, fleet owners, unlike the public at large where "economic losses" due to crashes tend to be diffused, are very much aware of their increased economic losses in recent years due to the downsizing of automobiles.

The automobile safety world has four major interested parties, each having a somewhat different business and social bias — the automobile manufacturers, the casualty insurance industry, the federal government and the public. Interacting with each of these are their customer/constituents, their employees, their suppliers, their funders and their competitors. Like many dialogues between large entities, the interactions among these parties get bound up in garbled rhetoric that impair their affecting a greater good. Airbag technology has been developed, tested and confirmed by the auto industry, but not espoused. The insurance industry championed, promoted and facilitated airbags with premium reductions, but cannot implement it. The government has encouraged, recognized and certified the airbag's value and utility, but in the recent past has backed off from its former support. The public is tragically uninformed on the issue and remains unprotected.

When the passive restraint requirements of FMVSS 208 were rescinded in October, 1981, all of the substantial participants in the airbag effort pulled out. Companies such as General Motors, Ford, Essex/United Technologies and Talley Industries stopped their airbag programs. That exodus left the smaller technology and research firms still there, but with a much greater emphasis on federal funding for their progress. The reason Breed Corporation stayed with the airbag effort was its belief that there is a need and a place for airbags as a retrofit in the existing fleet and as optional equipment on new cars. They see a large need-derived market for their airbag product. They believe along with the insurance industry that airbags can make a uniquely significant contribution to the health and welfare of the driving public, particularly the younger segment of that public. Such a contribution implies a great public financial benefit through reduced deaths (currently 50,000 a year) and serious injuries (750,000 a year).

When the passive restraint requirements of FMVSS 208 were rescinded in October, 1981, all of the substantial participants in the airbag effort pulled out. Companies such as General Motors, Ford, Essex/United Technologies and Talley Industries stopped their airbag programs. That exodus left the smaller technology and research firms still there, but with a much greater emphasis on federal funding for their progress. The reason Breed Corporation stayed with the airbag effort was its belief that there is a need and a place for airbags as a retrofit in the existing fleet and as optional equipment on new cars. They see a large need-derived market for their airbag product. They believe along with the insurance industry that airbags can make a uniquely significant contribution to the health and welfare of the driving public, particularly the younger segment of that public. Such a contribution implies a great public financial benefit through reduced deaths (currently 50,000 a year) and serious injuries (750,000 a year).

The Insurance Institute for Highway Safety states in its 1981-82 report that "[auto] crashes are the number one killer of teenagers. Nearly half of all deaths of 16-19 year olds are produced by injuries sustained in motor vehicles crashes". There is no other time of life when one feels more immortal than those late teen years and, hence, much more liable to throw caution to the wind. In this case, caution may be putting on the seat belt, not speeding, or foregoing some celebration drinks. Adults buckle up more, most watch their drinking and are generally more cautious and mortally aware. This is not so with the late teen group and it never has been. Therefore, this group must be looked after by the rest of society. It is the cars driven by teenagers that most desperately need to be equipped with Passive Restraint Systems.

AOPA has filed a brief in the U.S. Supreme Court as *amicus curiae* supporting the insurance industry's position that the Administration acted improperly in rescinding the passive restraint standards of FMVSS 208. In passing, may I comment that it seems unfortunate to me that the entire judicial process in cases of this nature does not provide an opportunity for a strong judge to gather all of the attorneys involved in the law suit in one room to attempt to work out a settlement of the dispute. For instance, Breed Corporation would urge a settlement which insured that all automobiles would be manufactured in such a way as to accept a retrofit airbag system. We would also like to see NHTSA develop and promulgate performance standards for components of airbags and passive seat belts. These components would then be certified by suppliers as meeting NHTSA's standards. The automobile manufacturers could then state that new vehicles were being equipped with automatic safety equipment (airbags or passive belts) chosen by the consumer which conformed in either case to specifications set by the federal government.

In connection with its airbag retrofit efforts, the Breed Corporation submitted a bid to NHTSA pursuant to the agency's request for proposals to retrofit state police cars with drivers side only airbags. As part of that proposal, we obtained a commitment for products liability insurance in the amount of \$1,000,000.00 at a cost of \$15.00 per airbag equipped car. This should be taken as further evidence if any is still needed, that the airbag technology is sound.

I attended a products liability seminar directed by attorneys from the Piper & Marbury law firm last year. The current factors in automobile products liability were:

1. The number of products liability cases involving automobiles is "exploding".
2. There is a "mushrooming" of punitive damage awards in automobile cases.
3. Recent cases reflect a "lowering of the threshold" for the awarding of punitive damages.
4. The standards for judging allowable levels of punitive damages is "just developing".
5. The jury issue of automobile crashworthiness is "inexorably entwined" with the award of punitive damages.

A recent article in *Trial* magazine of July 1982, under "Airbag Litigation" argued there was a "basis for liability of the manufacturers for failure to make airbags available". The *Automotive Litigation Reporter* for February 17, 1983 refers to a case started in Georgia where the plaintiff has sued a major automobile manufacturer for failure to equip a car with passive restraints. As a former personal injury defense counsel, I continue to hold a deep respect for the resourcefulness and ingenuity and abilities of plaintiffs's counsel and I expect that many similar personal injury cases will start especially after the first successful case receives large media play.

Other products liability cases are already reportedly working their way through the judicial system in which plaintiffs are seeking recovery for personal injuries suffered in automobile accidents solely on account of the failure of automobile manufacturers to provide airbags in their automobiles. If the plaintiffs prevail in these cases, it bodes ill for the automobile industry. As in almost everything connected with that industry, there are many zeroes after the dollar sign in estimates of the exposure to monetary damages (compensatory and punitive) of the manufacturers.

These cases should come as no surprise to the manufacturers. As long ago as 1977, an attorney for an insurance-supported research group forecast a "flood of test litigation in the near future" cresting upon the automobile manufacturers on account of "their concerted opposition even to offering passive (airbag) protection to their customers." Andrew R. Hricko, General Counsel to the Insurance Institute for Highway Safety, in an article entitled "T. J. Hooper and the Airbag" published in the *Federation of Insurance Counsel Quarterly*, Vol. 27, No. 3, Spring 1977, also stated:

"Based on historical precedent, voluntary action by these manufacturers is probably the least likely way in which change will occur. In the present climate of increasing product liability and multi-million dollar judgments, however, the manufacturers may wish to consider breaking historical precedent. To foster continued delay ... may not be in their stockholders' best interests."

"The question on passive restraints is not 'if' but 'when'. The only real question is how many more lives will be lost and how much more human suffering endured before automatic protection is in widespread use."

The "climate" referred to in this article may turn out to have been further sharpened by the action of the automobile manufacturers in "downsizing" automobiles without offering at the same time airbags to protect the occupants. A recent case (not involving airbags) has upheld the award of \$5,000,000 in punitive damages in an opinion which some product liability defense lawyers believe makes "a virtual insurer out of any manufacturer of small, light (and therefore economical) automobiles." See *Dorsey v. Honda Motor Company, Ltd.*, 655 F. 2d 650 (5th Cir., Unit B, 1981).

The National Highway Traffic Safety Administration estimates that in 1985 there will be a total of 40,600 occupant fatalities in automobile and truck accidents, of which 5,600 will be due solely to downsizing and the resultant mix of small and large cars on the highway. In 1990, the figures will be 45,300 and 10,300 respectively.

Professor William Nordhaus of Yale has testified on the societal costs of motor vehicle fatalities and injuries. Using a simplified procedure which combines the costs of societal injuries and fatalities, he said that each fatality cost \$585,000. It can be estimated, therefore, that the societal costs of downsizing automobiles will be about \$3.2 billion in 1985 (5,600 fatalities X \$585,000) and \$6.0 billion in 1990 (10,300 fatalities X \$585,000). One should not expect the insurance industry (or governors, state insurance commissioners and consumers) to stand idly by while insurance companies find themselves faced with these increased costs. Airbags, if they had been installed in these smaller cars, would have considerably lessened these societal costs.

There are other factors in the litigation climate that the automobile industry must be presently considering:

1. *Punitive Damages* — Punitive damage awards have "mushroomed" in automobile product liability litigation.
2. The plaintiffs' bar might become hesitant to settle ordinary automobile negligence cases at the insurance policy limits in those cases where the "value" of the case (i.e., the extent of their client's damages) exceeds the insurance policy limits. This may be the situation in the recent Georgia case referred to earlier. Once educated, they may feel compelled to sue the automobile manufacturers under the law of product liability lest they expose themselves to later malpractice claims.

Mr. Chairman, as a Member of the House of Representatives, I voted for the National Traffic and Motor Vehicle Safety Act of 1966. I regret that about the same number of Americans (50,000) are still being killed annually on our highways in automobile accidents as in 1966. I imagine that but for the 1966 Safety Act, the efforts of the automobile manufacturers to improve their products, and the national 55 mph speed limit, the toll would be much higher.

I respectfully urge you and the members of this committee to continue your actions to ensure that Americans someday will be able to buy airbag equipped automobiles.

[The following information was subsequently received for the record:]

BREED CORPORATION,
Fairfield, N.J., March 31, 1983.

Hon. JOHN C. DANFORTH,
*U.S. Senate,
Washington, D.C.*

DEAR SENATOR DANFORTH: Thank you again for permitting me to testify before your committee hearings on motor vehicle occupant protection.

I enclose my answers to your written questions posed to me by your letter of March 17, 1983.

May I take the liberty of suggesting to you the advisability of dedicating some portion of any oil import tax to automobile occupant safety Research and Development. I also enclose a rough draft of a "settlement proposal" of the passive restraint fiasco which makes considerable sense to us but would probably be fiercely resisted by the insurance interests and the automobile industry.

If we can ever be of any service to you, please do not hesitate to call upon us.
Sincerely,

THOMAS C. McGRATH, JR.

Enclosures.

Question. Airbag technology clearly exists. In your opinion, why are airbags not currently offered to American consumers?

Answer. Although the automobile manufacturers are best able to answer this question, I would venture my opinion that the reasons are:

- (1) Reluctance of the automobive industry to accept government mandates.

(2) Lack of real competition in the automobile industry. (If Oldsmobile, Buick, etc. were separate corporations, competition would have led to full scale airbag installation years ago).

(3) Financial difficulties of domestic manufacturers coupled with severe recession and low sales.

(4) Lack of incentives to develop really new technology.

Question. What do you believe can be done to encourage consumer acceptance of airbags?

Answer. 1. By means of mass production (2,000,000 units per yer), cut cost to consumer of full front seat airbags to just over \$200.00.

2. Large purchases by Federal Government, State and local Governments and Fleet Operators of driver's side only retrofit airbag systems.

3. Manufacturers to manufacture all automobiles with cavities in steering wheel and dashboard to accept retrofit airbag systems.

4. NHTSA to develop performance criteria for (a) Crash Sensors and Inflator/Airbag Assemblies, and (b) Passive Seat Belts. Then, suppliers would certify to the automobile manufacturer that these components met NHTSA's standards.

5. Thereafter, the manufacturers would sell new vehicles which would be equipped with automatic safety equipment freely chosen by the consumer. Subsequent purchasers could retrofit airbags if they so desired in cars having passive seat belts.

6. T.V. spots to educate public of the advantage of airbags.

Question. Do you consider airbags to be a more effective overall crash protection for front seat occupants than a lap-shoulder belt combination? Is it necessary for a vehicle occupant to wear a seat belt in order for an airbag to be effective?

Answer. It appears that in most severe crashes airbags offer more protection to automobile occupants than the lap-seat belt combination. Airbags also avoid the belt tensioning problems that the new Mercedes passenger belt-tensioning system is designed to avoid. Airbags also protect against windshield fragments, etc.

It is not necessary for an airbag to be effective that a lap belt be worn. In fact it appears that in some crashes the wearing of a lap belt will tend to accelerate the speed of the so-called "second collision", that is the impact of the automobile occupants with the car interior. In a roll-over collision lap belts may offer some extra protection, however, few people are killed or seriously injured in roll over accidents.

Under all of today's circumstances it may be preferable that airbags be widely installed as complementary or additional protection as demonstrated by Mercedes and apparently suggested by Ford.

A DRAFT PROPOSAL FOR FREEDOM OF CHOICE OF AUTOMATIC CRASH PROTECTION

NHTSA suspends the current FMVSS 208 and initiates rule making procedures for amended FMVSS 208 including:

(1) Eliminate all vehicle compliance crash testing from FMVSS 208.

(2) Substitute NHTSA developed performance criteria for (a) crash sensors and inflator/airbag assemblies, and (b) passive seatbelts. These components would then be certified by suppliers as meeting NHTSA's specifications.

The automobile manufacturers would sell new vehicles which would be equipped with automatic safety equipment chosen by the consumer which conformed to NHTSA's specifications.

(3) All vehicles manufactured after September 198 , would incorporate: (1) knee bolsters; (2) steering wheel having an inflator/airbag cavity; (3) passenger side inflator/airbag cavity in dashboard; (4) after September 198 , consumers could choose either: (a) automatic airbags with active lap seatbelts, or (b) passive seatbelts.

Senator DANFORTH. Finally, Mr. R. V. Durham, director, safety and health department, International Brotherhood of Teamsters.

STATEMENT OF R. V. DURHAM, DIRECTOR, SAFETY AND HEALTH DEPARTMENT, INTERNATIONAL BROTHERHOOD OF TEAMSTERS, ACCOMPANIED BY WARREN RHEAUME, ASSISTANT TO THE DIRECTOR; AND BARTLEY O'HARA, LEGISLATIVE COUNSEL

Mr. DURHAM. Good morning. My name is R. V. Durham. I am director of the safety and health department for the IBT. With me

this morning is Mr. Warren Rheaume, my assistant, and Mr. Bartley O'Hara.

Senator DANFORTH. Could you move the microphone a little closer, please?

Mr. DURHAM. Mr. Chairman, we appreciate the opportunity to appear today and express gratitude to you and the Subcommittee for your continued interest in highway safety. As a representative of hundreds of thousands of men and women who spend their working lives on the Nation's highway, we are vitally interested in any effort to increase the safety of that unique work place.

In 1981 the fatal accident reporting system identified over 5,400 medium and heavy truck accidents resulting in one or more fatalities. Many of those who died were truck drivers. In fact, roughly 2,000 medium and heavy truck occupant deaths are reported each year, making the job of the professional driver one of the most hazardous in America. Truck drivers sustained 9.9 percent of all work-related fatalities, yet comprise only 2.7 percent of the employed work force, according to 1979 Department of Labor statistics.

In recent years, the problem of truck occupant fatalities has received increasing attention. In 1979, the National Highway Traffic Safety Administration convened 2 days of public hearings before an expert panel on the issue of heavy truck safety. Much of the testimony received in that hearing was on the issue before us today, truck occupant protection. Yet for all the attention given to this problem, little concrete progress has actually been made in protecting our members from heavy truck accidents and their often fatal consequences.

Several truck safety issues not directly related to occupant protection require the immediate attention of Congress. I would like to mention just a few. Federal enforcement of existing truck safety rules is feeble at best for lack of adequate manpower or resources. Yet, the agency responsible for enforcement, the Bureau of Motor Carrier Safety, was recently forced by the Office of Management and Budget into cutting one of their most valuable enforcement tools, the driver's log book.

In the name of paperwork reduction, the Bureau has thus made it easier for fatigued drivers to stay on the road with little fear of detection. The Bureau itself, in a letter denying our union's petition for reconsideration, made the incredible statement: "While we agree that enforcement may be more difficult, it will not be impossible."

We understand that a similar effort is under way to emasculate the vehicle condition report, a document which alerts a driver to an unsafe condition in a vehicle he is about to drive, and informs him whether a discovered defect has been repaired. While a Federal regulation requiring this document seems grounded on plain common sense, it has been attacked, and, I might say, successfully defended, in the courts and is under fire within the administration as an unnecessary paperwork burden.

We understand the subcommittee plans to explore these and related issues in April. We would welcome the opportunity to appear at such a hearing and discuss these topics in greater detail.

Before we address specific problems in truck occupant protection, there is one matter of pressing highway safety importance we must bring to the Subcommittee's attention.

Under the terms of the Department of Transportation Appropriations Act of 1982, which was signed into law December 18, 1982, the carriers will soon begin legally operating vehicles 102 inches wide, as contrasted with the present national limit of 96 inches. Operation of these wider vehicles will, of course, require that they first be built by trailer manufacturers. It is at that point that the problem arises.

When the DOT appropriations bill passed, we recognized that a major safety advance was possible due to the new width limit. Over half of all truck accidents fatal to the occupant involve the rollover of the vehicle. The University of Michigan estimates that widening the vehicle track from 96 inches to 102 inches could result in a 30-percent reduction in truck rollover accidents. That reduction would directly translate into several hundred lives saved each year, along with a commensurate decrease in property damage.

The organization representing the trailer makers, the Truck Trailer Manufacturers Association, recognized this safety issue. In testimony before the National Motor Carrier Advisory Committee just 2 weeks ago, their director stated that it was their recommended practice that vehicle track width match the limits of vehicle width, and that he expected all manufacturers to comply with that practice in designing and manufacturing the 102-inch wide trailers.

We were surprised to learn that a major trailer manufacturer plans to build 102-inch wide trailers using the standard 71½-inch axle, the same axle it uses on 96-inch wide trailers. As reported in the February 1983 edition of Fleet Owner magazine, Fruehauf trailer division plans to do just that, choosing to totally ignore the safety consequences of its failure to widen the vehicle track.

We are unaware of the plans of other manufacturers. We urge the subcommittee to examine this serious problem and bring about through remedial legislation the safety gains the industry fails to realize.

Senator DANFORTH. Mr. Durham, I hate to interrupt you, but there is a vote on the Senate floor. My hope was to complete the hearing before we had any votes, but I was not able to make it. So what I would like to do now is leave and be back in about 10 or 15 minutes and then resume your testimony. Then we will go out and look at the cars that we have parked on the street.

So if you will forgive me, I will be right back.

Mr. DURHAM. Certainly.

[Recess.]

Senator DANFORTH. Thank you, Mr. Durham.

Mr. DURHAM. Turning now to truck occupant protection, we see several methods by which the Government, in cooperation with the drivers, employers, and manufacturers, can decrease the yearly death toll among truck drivers.

Chief among them is the need for continued research into heavy vehicles. Only recently did we begin to understand the frequent involvement of rollover and ejection in truck occupant fatalities. Unlike automobile manufacturers, domestic truck makers conduct little, if any, crash testing. Many European truck manufacturers

have extensive crash research and testing programs, as contrasted with their American counterparts, who rely on the Government for basic research.

In the research area, the Government has, until recently, performed well. Between the fiscal years 1979 and 1982, the NHTSA the National Highway Traffic Safety Administration, through the Office of Heavy Duty Vehicle Research, spent an average of \$1.8 million on heavy vehicle research.

While hardly a huge sum of money, this funding enabled research in some important areas, to name a few: the air brake testing; brake retarder testing; school bus crash research; tire traction, splash and spray; truck crashworthiness; handling and stability; and seat belt design and use.

However, in the fiscal year 1983 budget the funding for this vital research was cut from the fiscal year 1982 figure of \$1.8 million to \$350,000, an 80-percent reduction. The budget request for fiscal year 1984 is \$360,000. In addition, the status of heavy vehicle research has been reduced from within NHTSA from an autonomous office to a loosely structured group, indicative of NHTSA's new indifference to truck safety issues.

Funding at levels adequate to complete existing research projects and conduct needed new research is imperative if we stand a realistic chance of improving heavy truck safety performance in the near future. Without such research, many such manufacturers will continue to do little more than the bare minimum required by law, and the private safety community will be unable to make up the difference.

If and when NHTSA is in a position to continue its research duties, we recommend that the subcommittee take an active role in establishing program priorities. In light of the frequent and often fatal involvement of rollover and ejection in truck accidents, NHTSA should focus further research and, if necessary, future regulatory efforts on the following areas: cab integrity/survival space maintenance; glass, especially the windshield, retention; passive and active occupant restraints; stability and handling; cab size/driver accommodation; and crash testing.

In addition, further attention needs to be given to the driver's environment, both as a way to reduce injuries during an accident and to prevent accidents through greater vehicle control. Just recently, a society of automotive engineers study, jointly funded by our union, the Government, the manufacturers, and the industry, revealed that truck drivers are, as a group, significantly larger than the general driving population.

For example, the weight of the 95th percentile U.S. male, the man that is larger than 95 percent of the population, is 217 pounds. The 95th percentile truck driver weighs 263 pounds, some 46 pounds heavier than his counterpart in the general population. Other measurements show a similar difference.

We have a copy, Mr. Chairman, of this study which we would be glad to leave with the committee, which gives greater detail on the

differences between the truck driver size both in height, weight and so forth. It is both male and female.¹

Since truck manufacturers have historically designed their vehicles around the 95th percentile male, these findings are extremely significant. Seating, restraint assemblies, and controls designed to accommodate a 217-pound man will likely be inadequate for larger, heavier individuals. Developing new means of bringing heavy vehicles into more accurate fit with the people operating them should be a high priority with both NHTSA and the industry.

Other issues will require long-term research, development and regulatory commitment from the Government if we are to continue to improve truck occupant protection and reduce the number of truck accidents. To mention a few: steering wheel shock absorption; stopping distance and control stability; multiunit brake timing and compatibility; in-cab noise; ride quality; ingress and egress; field of view; control placement; and demonstration/evaluation projects.

The sad thing is, none of these programs will be possible at the present level of NHTSA funding for heavy truck research. Without a firm commitment from this administration, backed up by money and agency resources, any statement about the importance of truck safety will have a hollow ring to it. We urge the subcommittee to ask this administration if it plans to back the strong prosafety remarks made in recent months with equally strong action. The time to make bold strides in truck safety is now.

Mr. Chairman, we appreciate the opportunity to be with you today and to give you the truck drivers' perspective, and we would be glad to answer any questions you might have.

Senator DANFORTH. Do you have ready access to NHTSA? Does the union deal with NHTSA and communicate with it on a frequent basis?

Mr. DURHAM. I would say yes. We stay in touch with Bob Clark's group, which is in charge of this heavy truck safety research program, which is just about to be phased completely out with the appropriations they are receiving. We met with Mr. Peck on several occasions to give them our view on some of the concerns we have.

In addition to that, we have had the opportunity, I guess, to make some input by serving on their National Motor Carrier Advisory Committee and the National Highway Safety Advisory Committee. So we do have an opportunity to rap in that sense.

Senator DANFORTH. But your general view is that especially with respect to research there has been a significant cut in funds available for it. How would you characterize the rest of the activity of NHTSA with respect to your industry?

Mr. DURHAM. I would share what Dr. Baker said earlier. That is, that unfortunately the rulemaking and research has primarily been in the automobile area. Until a year or so ago, we were able to convince NHTSA to do some crash testing with tractor semi-trailers. There had never, to our knowledge, been any of it done before—

¹ The material referred to ("U.S. Truck Drive Anthropometric and Truck Work Space Data Survey", by Mark S. Sanders, Ph.D., Canyon Research Group, Inc., Westlake Village, Calif. 91361. Submitted to Society of Automotive Engineers, Inc., January 1983) has been retained in the committee files.

The same standards that have been promulgated for the automobiles, many of them do not apply to trucks. So I would say that we have been disappointed not only in this administration but previous administrations over the efforts in safety and heavy truck research. We were beginning to see some improvement in the research area in the years that I alluded to, but then, more recently, it seems that is now being cut out.

The emphasis seems to be on a voluntary seat belt type program and I think that is an important area too, but——

Senator DANFORTH. Do you think it does more good?

Mr. DURHAM. Well, we have—we recently ran a survey among our members in cooperation with NHTSA and we found that about 6 percent——

Senator DANFORTH. Six?

Mr. DURHAM. Even though there is a mandatory DOT regulation for seat belts to be worn by professional drivers, we found only about six percent using them——

Senator DANFORTH. Six.

Mr. DURHAM. Yes.

Senator DANFORTH. Why is it so low? You would think that they would be very safety conscious.

Mr. DURHAM. Well, we found some interesting reasons being given by the drivers. One of the major reasons was that the belts were dirty. They were laying in the floorboards and greasy and the truck drivers take some pride in their appearance and they did not want to strap the belt across their stomach and get grease or dirt on their clothes. We have tried to promote the retractable type seat belts with the carriers to correct that problem.

Another reason given was that they were concerned that they would be trapped and could not get out. We would be glad to share with the subcommittee the results of that survey, which was pretty interesting.

Senator DANFORTH. But your feeling is that mandatory requirements that they wear seat belts produced very little results.

Mr. DURHAM. That is our impression, yes.

Senator DANFORTH. My view is really the same as Mrs. Baker's. That is, I think that this is an area which really has received very little attention from the standpoint of either the Government or the public. It is amazing, if 25 percent of fatalities caused in industry are fatalities related to driving vehicles. And in your industry, of course, it would be probably close to 100 percent.

Mr. DURHAM. It is a serious problem. As I mentioned, like the 102 inches, which we supported, we just continue to be amazed at the indifference shown in some of these areas.

What it has forced us to do, Mr. Chairman, in our collective bargaining agreements is to negotiate certain protections that should have been provided through regulatory action such as the seats, the air-conditioning, the ingress-egress. Those are the areas that we have pleaded with the agencies for years and years and could not get anyone to listen.

Senator DANFORTH. Why is that, do you think—just not enough time for it?

Mr. DURHAM. Well, I think you get into the different philosophical views as to what part the government should play and what

should be left to the labor-management area. In the regulatory area, where the regulations have been applied to the automobiles, we see no justification of why they cannot be carried on over into the heavy truck area.

I visited one of the truck manufacturers here recently that is building a fiberglass truck cab. Of course, they conceded that there was no crash testing done, but they are no different from anyone else. There is no truck crash testing being done by any of the manufacturers as far as running into barriers and so forth.

The reason given by the manufacturers is the truck generally, if they are going to hit something that hurts the driver, it is going to be a bridge abutment and he will be dead anyway. We do not subscribe to that because about two-thirds of the fatalities involved are in rollovers and ejections.

Senator DANFORTH. Thank you very much for being here and especially for your patience in waiting.

Mr. DURHAM. Thank you.

[Whereupon, at 12:28 p.m., the subcommittee adjourned, to reconvene at 9 a.m., March 11, 1983.]

[The following information was subsequently received for the record:]

INTERNATIONAL BROTHERHOOD OF TEAMSTERS
CHAUFFEURS, WAREHOUSEMEN & HELPERS OF AMERICA,
Washington, D.C., May 12, 1983.

Hon. JOHN C. DANFORTH,
Chairman, Surface Transportation Subcommittee, Committee on Commerce, Science
and Transportation, Washington, D.C.

DEAR SENATOR DANFORTH: We are pleased to respond to the questions on highway safety posed in your letter following up the Surface Transportation Subcommittee's March 10th hearing. For your convenience, we have included your questions along with our answers.

Again, our thanks for your interest in this issue of vital importance to our members.

Sincerely,

R. V. DURHAM,
Director, Safety and Health Department.

Question. With regard to NHTSA's reduced research budget to which you refer in your testimony, what are your specific concerns as related to the trucking industry?

Answer. We believe NHTSA's Office of Heavy Duty Vehicle Research requires, at a minimum, funding adequate to conduct research in the following areas:

- Heavy truck crashworthiness;
- Heavy truck stability;
- Splash and spray;
- Interior cab space needs;
- Heavy vehicle braking;
- Conspicuity; and
- Steps and handholds.

Question. In what ways do you believe truck crashworthiness could be improved? Do you believe trucking companies would be willing to pay for these improvements?

Answer. We believe advances in available technology, such as controlled crush surfaces, integral roll cage construction, improved windshield design and less hostile interiors have the potential to produce a reduction in truck occupant fatalities and injuries . . . but only if they are used. The Surface Transportation Assistance Act of 1983 removes the tractor unit from the length equation, thus providing manufacturers with greater flexibility in designing crashworthiness into heavy vehicles.

As to whether trucking companies should specify vehicles so equipped, that question is best answered by the companies themselves. However, if proven technologies and designs were willfully omitted on a vehicle, the manufacturer and/or carrier would bear potential exposure in a product liability suit.

Question. You express in your testimony the need for truck safety legislation. How great is the safety problem in the trucking industry? What specific areas do you believe should be addressed?

Answer. We believe the need for increased safety in our industry is very great. A great step forward in this area would be realized through passage of Title III of S. 1108, the "Motor Carrier Safety Act of 1983."

MOTOR VEHICLE SAFETY AND THE MARKET-PLACE: GOVERNMENT-INDUSTRY EFFORTS TO IMPROVE HIGHWAY SAFETY

FRIDAY, MARCH 11, 1983

U.S. SENATE,
SUBCOMMITTEE ON SURFACE TRANSPORTATION,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, D.C.

The subcommittee met, pursuant to notice, in room SR-253, Russell Senate Office Building, Hon. John Danforth (chairman of the subcommittee) presiding.

Senator DANFORTH. This is the third of a 3-day series of hearings on motor vehicle safety, and today we have several Government witnesses and also representatives of the auto companies and the insurance industry. There are about nine names on my list. It is quite a list of witnesses.

The witnesses have written statements. Those statements, of course, will be inserted in the record. You do not even have to take any part of your allotted time to ask for that permission. Just take that as a matter of course, and try, if you will, to stay in the time limits the staff has discussed with you.

I have a statement for the record from Senator Hollings.

[The statement follows:]

OPENING STATEMENT BY SENATOR HOLLINGS

This is the last day of three days of hearings scheduled on automobile safety technology. Today the Committee will hear from a number of witnesses representing the Administration, the automobile manufacturers, and the insurance industry. These witnesses have valuable experience with the development and marketing of safety technology.

I will be interested in testimony from General Motors concerning their plans to test the new non-lacerating "Securaflex" windshields in some of their automobiles and the testimony from Mercedes-Benz concerning plans to offer airbags as options in some 1984 models.

I would like to again thank Senator Danforth for bringing this issue to the attention of the Committee through these hearings. These hearings focus on an issue of exceptional importance to all of us—how can we work to improve automobile safety? Because of my concern for safety, I have been a strong supporter of federal drunk driving legislation. With the passage of a federal drunk driving bill last Congress, we must now look to other ways to stem the tragic loss of life on our nation's highways. I am sure these hearings will help us explore new and developing ideas in transportation safety.

Senator DANFORTH. The first witness is Jim Burnett, who is Chairman of the National Transportation Safety Board.

STATEMENT OF HON. JIM BURNETT, CHAIRMAN, NATIONAL
TRANSPORTATION SAFETY BOARD, ACCOMPANIED BY PETER
KISSINGER, MANAGING DIRECTOR; AND BARRY SWEEDLER, DI-
RECTOR, BUREAU OF SAFETY PROGRAMS

Mr. BURNETT. Thank you, Mr. Chairman.

I would like to introduce a couple of Safety Board staff members with me today: Mr. Peter Kissinger, who is the managing director of the Safety Board; and Mr. Barry Sweedler, who is Director of the Bureau of Safety Programs.

Thank you for this opportunity to testify today at this very important hearing on automobile safety. The National Transportation Safety Board is best known for its investigations of major air carrier accidents. But as you know, the Safety Board also investigates accidents in other transportation modes: Highway, rail, marine and pipeline. Our role is broader than simply conducting impartial investigations. The Board also determines the probable cause of accidents and makes safety recommendations.

The Board takes its congressional mandate to enhance safety very seriously. Our highest priority is to develop recommendations which will prevent future accidents and minimize the death and injury potential of those that do occur.

It is important to remember that the Safety Board is a small agency with a big job. Given our limited resources, we have focused our efforts on safety issues which will have the largest possible impact on saving lives and averting serious injuries. The application of this principle to all transportation modes has led us to a heavy emphasis on automobile safety, because, while very encouraging progress has been made in reducing serious highway accidents, the annual death and injury toll far exceeds that experienced in all other modes combined.

Thus we have begun to target our highway accident investigations to specific safety issues. For example, we will take a safety issue such as the use of child safety seats and conduct a number of investigations in which the effectiveness or lack of use of the child seat is an issue. By so doing, we can begin to develop knowledge that will lead to recommendations that save lives and reduce injuries.

We are convinced that child safety seats have proven life-saving and injury-prevention capabilities. In December of last year, the Board adopted a safety recommendation urging States to require the use of child safety seats for children under 5 years of age. And we have conducted, under the leadership of our Vice Chairman, Patricia Goldman, a series of hearings across the Nation to draw attention to the importance of the use of the safety seats.

The need for child passenger safety laws is compelling. Automobile accidents are the No. 1 killer andcrippler of young children in this country. More than 650 children under age 5 are killed in auto crashes each year. The annual injury toll for the same age group is 50,000.

Many States have responded positively to the Safety Board's recommendation and have child passenger protection laws under consideration. One State, South Carolina, recently adopted a new law. This brought the number of States with such laws to 21, plus the

District of Columbia. The Governors of New Jersey, Georgia, and Oklahoma have child safety seat bills on their desks awaiting signature.

The Safety Board also has placed a great deal of emphasis on the problem of alcohol in all transportation modes. On the highway, it is the single most life-threatening factor. Nationwide, 25,000 Americans are killed in alcohol-involved accidents each year. About 5,000 of them, 20 percent, die in alcohol-involved accidents in which the driver was under age 21, even though only 8 percent of all drivers are in that age group.

Unfortunately, the chilling statistics do not end there. Added to the Nation's death toll are 650,000 injuries a year from alcohol-involved accidents, and again teenagers are grossly overrepresented with 130,000 of those injuries. These disturbing statistics caused the Board to focus a major accident-prevention effort on teenage drunk driving.

I am pleased to note that there has been a real awakening around the country to the drunk driving problem generally. This subcommittee has played a major leadership role in this effort with the adoption last year of the alcohol traffic safety incentive grant program for the States.

The Safety Board has chosen to focus its efforts on one very important step: Raising the drinking age to 21. This is one measure that has been proven to be effective in reducing teenage drunk driving deaths. For example, a study showed that alcohol-involved accidents among 18- to 20-year-old drivers in Michigan dropped 31 percent during the first year after the State raised the drinking age from 18 to 21.

And the Insurance Institute for Highway Safety discovered in its study of nine States that raised the drinking age that eight of them experienced fewer nighttime fatal crashes involving young drivers, with an average annual reduction of 28 percent.

The Institute also estimated that in 14 States that have raised the drinking age since 1976, 380 fewer young drivers are involved annually in nighttime fatal accidents. They calculated that another 730 young drivers could be saved if the drinking age were raised to 21 in the 35 States with a younger legal minimum.

When you factor in the multiple fatalities that occur in some of these crashes, we feel that the number of lives which could be saved is approximately 1,250 a year. An overwhelming majority of those are young Americans.

So in July 1982 the Board recommended to States that they raise the drinking age to 21. Since then, I have testified on the issue before State legislatures in New Jersey, which now has increased its drinking age, Colorado, Nebraska, Virginia, and Wyoming. An appearance before the Florida legislature is scheduled for next month and I have made it known that I am available to testify in other States which may be considering an age 21 bill.

Mr. Chairman, I want to thank you again for the opportunity to tell the subcommittee about the Safety Board's strong emphasis on automobile safety. I would be pleased to respond to any questions that you may have.

Senator DANFORTH. Thank you very much.

Your agency is very well known for investigating aircraft accidents and crashes, probably more than any other single area. Some of us I think lose sight of the fact that you have other responsibilities. What else, other than the air crashes, do you do?

Mr. BURNETT. We investigate selected surface transportation accidents—highway, marine, railroad, and pipeline—and we also make safety recommendations to prevent accidents in those areas, just as we do in aviation.

Senator DANFORTH. Is a significant portion of the effort and the manpower of the Board spent on highway safety, or is that less?

Mr. BURNETT. Less than we would desire. About 50 percent of our total manpower effort is in the aviation area. We are endeavoring, however, with the limited resources we have, to create a more effective highway program.

It has become quite apparent to us that we cannot conduct a highway safety program in quite the same way we do with aviation. In aviation, we investigate or cause to be investigated every accident and determine the probable cause of all the accidents. Because we only can investigate such a miniscule fraction of the highway accidents, we have to exercise a lot more judgment and do a lot more focusing of our resources. So we select issues that not only involve a significant number of lives, but also that are timely, so that we can get maximum effectiveness out of very small resources.

Senator DANFORTH. Do you view yourself as an advisory agency? That is, do you analyze the cause of accidents and then recommend how to reduce the number of accidents and present that information to others?

Mr. BURNETT. We have no influence over transportation safety except through our advice. My personal philosophy is to go a bit beyond that and say that we are an advocacy agency, and we try not only to issue recommendations, but also to assume some responsibility for what happens to them after we issue them.

Senator DANFORTH. What is your relationship to NHTSA? How do you function with respect to NHTSA?

Mr. BURNETT. We make safety recommendations to NHTSA, as we do to the other modal agencies, and in fact many other Government agencies that are not really exclusively in the transportation field.

Senator DANFORTH. Are those recommendations generally taken?

Mr. BURNETT. Mr. Kissinger, do you have the figures on what NHTSA is doing at this time with regard to the adoption of our recommendations?

Mr. KISSINGER. In 1981, for example, Mr. Chairman, we had a 100 percent acceptance rate from NHTSA. So we have generally had pretty good response from them. In 1980 we had a 66 percent acceptance rate.

I might also add to Chairman Burnett's remarks that we have an interagency agreement with the National Highway Traffic Safety Administration, so we tend to avoid any duplication of effort in any accident investigation that they perform and we might perform also.

Mr. BURNETT. I think, Mr. Chairman, that our major new highway safety initiatives, the child safety seat and drinking age issues, are ones that we decided could best be promoted by working with

the State legislatures, rather than by Federal regulation. We felt that we could obtain substantial progress in the State legislatures before a compliance system could be set up to try to use the Federal Government to force the States to do something.

In fact, when the State decides for itself that it wants to follow a policy, you get a lot more credibility on the enforcement level and a lot more emphasis than if a policy is imposed from Washington.

Senator DANFORTH. We had that question with the drunk driving legislation last year. What should be the role of the Federal Government as compared with the State governments? To what degree should we be trying to tell them what sorts of drunk driving legislation they should pass?

Do you have any notion as to how we should operate in that respect? Was the drunk driving legislation the right kind of approach, basically an incentive to the States, or was that stepping too softly or too heavily?

Mr. BURNETT. I think we need to wait and see how it works. Certainly, the passage of that legislation is causing some attention to be given by State governments to some of these issues.

On the issue that I have been most closely related to, the issue of the drinking age, I do not know that the incentive there has been that powerful, and in fact to some degree I think it has tended to shift the debate away from what is right, what is good, what is the most effective policy, to how can we get the Federal money with the least amount of effort.

So I think there are definitely pros and cons to that, and I think that program is one that we should watch to see what effect it does have.

Senator DANFORTH. Do you have any particular advice as to where we should go from here? What should Congress be doing with respect to States? Should we just watch the drunk driving legislation and find out what happens, or should we proceed further?

Mr. BURNETT. I think on these issues right now we need to give the State legislatures a chance to take some action, and the action is going forward quite rapidly, surprisingly so, I think, on the child safety seat issue. The problem there is that, though some of the laws are better than others, those programs will only be effective if there is really a creative enforcement effort.

The age 21 issue is more difficult, because you have a strong economic lobby in the States against it. But I think it is proven that when the States raise their drinking age that it saves lives. I think it is really another question as to whether Congress could impose that and have the same beneficial effect.

Senator DANFORTH. Finally, on the question of cooperative efforts with an industry, in this case the auto industry, versus mandatory regulations, do you have any views that you can share on that?

Mr. BURNETT. I think a lot can be achieved through cooperative efforts, and certainly sometimes there has been a confrontational environment between industry and Government which has been destructive to progress. We have recently had an example in the aviation mode, and I hope you will give me the liberty of borrowing our experience. We think that is very valuable, to borrow experience from another mode.

We used an industry conference to try to solve the problem of misfueling, placing jet fuel where you should have aviation fuel. That issue had been addressed back in 1975. The FAA had attempted to do something with that through the regulatory system and got a lot of opposition to it. And by calling an industry conference which involved the aviation industry and also the petroleum industry, we have achieved a fix that will provide, just as we have with unleaded gasoline in automobiles, nozzles and inlet tube sizes that will prevent that from happening.

Another area is in the Operation Lifesaver program which we have promoted, where the railroad industry has undertaken an education program, cooperating with the highway industry and with the law enforcement agencies in the States, to make people aware of the dangers of highway-rail grade crossing accidents.

In the last 5 years we have cut the fatality rate in such accidents in half, from about 1,100 at the beginning of the program to less than 600, hopefully less than 550, when we receive final figures for last year.

Senator DANFORTH. With respect to automobile accidents, do you have any sense as to the degree to which the design and the construction of automobiles and their equipment is related to accidents and fatalities, as opposed to driver habits or construction of highways or matters that are really unrelated to the design of the car?

Mr. BURNETT. I think it is clear that in highway, as in other modes of transportation, that we have done a much better job of improving the vehicle than we have of improving the human performance involved, and that it is time that we change our emphasis to some degree to try to deal with the human performance area.

The problem with that is that human habits are hard to change. I think you can easily see, though, in the highway mode, that it takes years to change the character of your highways, because highway construction involves a certain degree of permanence. And it's the same way, especially these days, with the vehicles. It takes years before you change your fleet. So I think it is very profitable for us to seek some improvements in human performance and to somewhat switch the emphasis.

However, there has been some comment about this issue in the press that disturbs me. I think we should not abandon efforts to improve the vehicle or to improve the highway. We should continue to look for reasonable ways to make those improvements. I think we do need to shift our priorities.

Senator DANFORTH. Other than drunk driving legislation and raising the drinking age, do you have any ideas for what we can do with respect to the driver himself?

Mr. BURNETT. We are working now on some potential recommendations that may deal with education, both in the area of restraints and in the area of alcohol and drug abuse. It is my belief that we should be doing more from kindergarten up in education about alcohol and drugs, because it is such an important social issue in our society, and I do not think we have ever addressed that adequately.

One of the important benefits from the use of child safety seats is that we begin to have children become accustomed, at very young ages, to being restrained in automobiles. But then we take

them into the school system that may have been in the habit of being restrained for 5 years and we put them in school buses where they are not restrained, and maybe give very little education and training on the use of restraint systems.

So when they reach driving age they are no longer used to using restraints. So I think we ought to look at this not only as a regulatory problem, but also as an educational problem.

Senator DANFORTH. Thank you very much, sir.

Mr. BURNETT. Thank you.

[The statement follows:]

STATEMENT OF HON. JIM BURNETT, CHAIRMAN, NATIONAL TRANSPORTATION SAFETY BOARD

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to testify today at this very important hearing on automobile safety.

The National Transportation Safety Board is best known for its investigations of major air carrier accidents. But as you know, the Safety Board also investigates accidents in other transportation modes: highway, rail, marine and pipelines.

And our role is broader than simply conducting impartial investigations. The Board also determines the probable cause of accidents and makes safety recommendations.

The Board takes its congressional mandate to enhance safety very seriously. Our highest priority is to develop recommendations which will prevent future accidents and minimize the death and injury potential of those that do occur.

But we are simply wasting our time and the taxpayers' dollars if our recommendations do not lead to tangible results. Thus, we are placing more emphasis on follow through. We will not rest until we know that we have done everything within our power to encourage the responsible parties to make changes in laws, regulations or procedures that we believe will save lives.

In many cases, we can achieve changes without recommending heavy-handed federal intervention. Whenever possible, we work directly with carriers and vehicle manufacturers to accomplish voluntary modifications that will enhance safety.

It is important to remember that the Safety Board is a small agency with a big job. Given our limited resources, we have focused our efforts on safety issues which will have the largest possible impact on saving lives and averting serious injuries. The application of this principle to all transportation modes has led us to a heavy emphasis on auto safety because, while very encouraging progress has been made in reducing serious highway accidents, the annual death and injury toll far exceeds that experienced in all other modes combined.

Thus we have begun to target our highway accident investigations to specific safety issues. For example, we will take a safety issue such as the use of child safety seats, and conduct a number of investigations in which the effectiveness or lack of use of the child seat is an issue. By so doing, we can begin to develop knowledge that will lead to recommendations that save lives and reduce injuries.

We are convinced that child safety seats have proven life-saving and injury-prevention capabilities. In December 1982, the Board adopted a safety recommendation urging states to require the use of child safety seats for children under five years of age.

The need for child passengers safety laws is compelling. Automobile accidents are the number one killer andcrippler of young children in this country.

More than 650 children under age five are killed in auto crashes each year. The annual injury toll for the same age group is 50,000.

The Safety Board is conducting a study of motor vehicle child passenger protection. As a part of this effort, we have launched 45 accident investigations to examine, in-depth, crashes involving young children.

One dramatic example of the benefits of child safety seats involved an accident in New York on June 28, 1982, in which two children were riding in the rear seat of a Volkswagen that was struck broadside by a motorcycle. One child, who was riding in a safety seat, received minor injuries from flying glass. The child riding next to her, unrestrained, died of multiple injuries.

Another of our safety seat investigations led to exemplary and productive government-industry cooperation to correct a potential problem.

In this case, we found that a child safety seat, convertible for both infants and toddlers use, had been used in the toddler configuration to restrain an infant. The seat had been shipped in this configuration from the factory.

Although the misuse was not found to be related to the cause of the fatality in this particular case, the Safety Board contacted the seat manufacturer to discuss the problem. I'm pleased to report that the company has agreed to ship its seats in the infant configuration. This is helpful because most seats are bought for infants and because it is easier to misuse the seat by putting an infant in the toddler configuration than the reverse. The company also has made substantial improvement in the accompanying instructions.

Another facet of our child passenger safety study involves regional public hearings. A hearing was held in Dallas on January 13, one was held in Philadelphia on February 4 and one is planned for St. Louis on March 24.

This summer, after our accident investigations and public hearings are completed, the Safety Board will publish a report summarizing its findings.

In the meantime, many states have responded positively to the Safety Board's recommendation and have child passenger protection laws under consideration. One state, South Carolina, recently adopted a new law. This brought the number of states with such laws to 21, plus the District of Columbia.

The governors of New Jersey, Georgia and Oklahoma have child safety seat bills on their desks awaiting signature.

The experience of states that already have child passenger safety laws confirms what the preliminary results of our investigations have shown: the use of safety seats can save lives. In Tennessee, which adopted its law in 1978, child fatalities have been reduced from more than twenty per year before the law to just six last year. The Safety Board believes that proper use of safety seats could prevent ninety percent of child fatalities and a vast majority of serious injuries to children.

The Safety Board also has placed a great deal of emphasis on the problem of alcohol in all transportation modes. On the highway, it is the single most life-threatening factor. Nationwide, 25,000 Americans are killed in alcohol-involved accidents each year.

About 5,000 of them—20 percent—died in alcohol-involved accidents in which the driver was under age 21, even though only eight percent of all drivers are in that age group.

Unfortunately, the chilling statistics do not end there. Added to the nation's death toll are 650,000 injuries a year from alcohol-involved accidents, and again, teenagers are grossly over-represented with 130,000 of those injuries.

These disturbing statistics caused the Board to focus a major accident-prevention effort on teenage drunk driving.

I am pleased to note that there has been a real awakening around the country to the drunk driving problem, generally. This subcommittee has played a major leadership role in this effort with the adoption last year of the alcohol traffic safety incentive grant program for states.

Last month, the National Highway Traffic Safety Administration issued final rules for the incentive program. As a former judge, I believe very strongly that many of the measures that are to be encouraged, including more arrests and swifter and surer sentencing of drunk drivers, will provide significant safety benefits.

Utilizing the targeting criteria I mentioned earlier, the Safety Board has chosen to focus its efforts on one very important step: raising the drinking age to 21. This is one measure that has been proven to be effective in reducing teenage drunk driving deaths.

For example, a study showed that alcohol-involved accidents among 18- to 20-year-old drivers in Michigan dropped 31 percent during the first year after the state raised the drinking age from 18 to 21.

And the Insurance Institute of Highway Safety discovered in its study of nine states that raised the drinking age that eight of them experienced fewer nighttime fatal crashes involving young drivers, with an average annual reduction of 28 percent.

The Institute also estimated that in 14 states that have raised the drinking age since 1976, 380 fewer young drivers are involved annually in nighttime fatal accidents. They calculated that another 730 young drivers could be saved if the drinking age were raised to 21 in the 35 states with a younger legal minimum.

That's a total of 1,110 young lives that could be saved. Since some of those drivers would have passengers or would collide with other vehicles, it is reasonable to factor in the average number of deaths in fatal crashes and estimate that 1,250 lives would be saved if all states had an age-21 drinking law.

So, in July 1982, the Board recommended to states that they raise the drinking age to 21. Since then, I have testified on the issue before state legislatures in New Jersey, which now has increased its drinking age, Colorado, Nebraska, Virginia and Wyoming. An appearance before the Florida legislature is scheduled for next month and I have made it known that I am available to testify in other states which may be considering an age-21 bill.

I am pleased that the Safety Board has been joined in this effort by the Presidential Commission on Drunk Driving, as well as many national, state and local organizations. This effort should be enhanced by the Surface Transportation Assistance Act adopted by the Congress and signed by President Reagan in December, which encourages states to raise the drinking age to 21.

Mr. Chairman, I want to thank you again for the opportunity to tell the Subcommittee about the Safety Board's strong emphasis on automobile safety. I would be pleased to respond to any questions that you may have.

[The following information was subsequently received for the record:]

QUESTIONS OF THE COMMITTEE AND THE ANSWERS THERETO

Question. The NTSB has made impressive contributions in encouraging enactment of State child restraint laws and in urging an increase in the drinking age in each State to 21. Are their other specific highway safety issues in which you envision becoming involved? If so, what types of issues and actions?

Answer. The National Transportation Safety Board is involved in looking more closely at a number of highway safety areas influenced strongly by human factors, including human performance. This interest recently has been demonstrated in the Board's extensive work related to increasing the use of infant and child restraint devices and a variety of projects focused on helping to reduce the losses resulting from drunk driving. The Board has also long been involved in working to solve problems related to various aspects of truck driver safety—serious licensing loopholes that permit drivers with records of drunk driving and/or moving traffic violations (including crashes) to gain employment as truck drivers, including hazardous materials trucks, and insufficient training for truck drivers, both in driving skills and in the proper handling of cargo, especially hazardous materials.

The Board continues to believe that the engineering and design of highways and vehicles is also an important factor in crash losses and their reduction. Some of the issues in these areas of concern to the Board are: heavy truck safety, including questions of braking technology for heavier and longer trucks; highway pavement skid resistance; occupant restraint effectiveness in small cars; highway safety appurtenance design in relation to both heavy vehicles and small/light cars; and safety improvements possible through highway restoration and reconstruction.

Question. You noted in your testimony that NTSB works whenever possible with carriers and vehicle manufacturers to accomplish voluntary modifications that will enhance safety. In your highway safety efforts, have you been working with any such individuals or groups?

Answer. The Board often seeks to work cooperatively with groups involved in a variety of highway safety activities. Over the years, and on a continuing basis, the Board has worked with such groups as the National Safety Council, ad hoc safety groups such as Mothers Against Drunk Drivers, state highway departments (on an individual and collective basis, through AASHTO), the Motor Vehicle Manufacturers Association, the insurance industry, etc.

Question. You noted in your testimony some the benefits of cooperative approaches to promote safety. Are there any specific highway safety areas, however, where you believe Federal regulation, rather than voluntary efforts, are necessary to protect the American public?

Answer. The Safety Board does not believe that there is any one "solution" that is most effective and appropriate to the wide variety of safety problems which it addresses, and the efficacy of federal regulatory action, state action, or voluntary efforts is evaluated in determining which approach to use. Often more than one of these approaches combined will produce better results than any one of them might on its own. The recent efforts to reduce the losses resulting from drunk driving is an example of this: an enormous voluntary effort by many grass roots organizations, private companies and public service groups; state and local governmental work to change laws and to fund drunk driving related services; and intense activity at the federal level (the White House, Congress and an array of federal agencies) have all been drawn on to focus national attention on this large-scale highway killer. This is

clearly an area in which "federal regulation" would be of little effect, since it requires a massive changing of public attitudes and strong implementation and enforcement at the state and local level.

Essentially, the Safety Board attempts, on a case by case basis, to determine what approach or combination of methods will best serve the safety needs in the particular situation, and makes recommendations consistent with that determination.

Senator DANFORTH. Next is Ray Peck, Administrator of NHTSA.

**STATEMENT OF HON. RAYMOND A. PECK, JR., ADMINISTRATOR,
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, AC-
COMPANIED BY MICHAEL FINKELSTEIN, ASSOCIATE ADMINIS-
TRATOR FOR RESEARCH AND DEVELOPMENT**

Mr. PECK. Mr. Chairman, good morning. I would like to introduce for the record my Associate Administrator for Research and Development, Michael Finkelstein, who is known to the committee and to you, I am sure.

I am pleased to be able this morning to be discussing with you what NHTSA has been doing and can do to make improved automotive safety technology available to the public.

This is a particularly exciting time for the agency, for all interested in highway safety. We are right now experiencing the greatest decline in the rate of fatalities on our Nation's highways since we have been keeping records. The absolute number of fatalities on our Nation's highways in calendar year 1982 was the lowest since 1963. That makes it an exciting time because it gives us, for the first time in many years, an exciting opportunity, and a challenge.

The challenge is to make sure that we identify the causes for these reductions, and hold our ground, if you will. One of the important elements in the agency's mission is identifying countermeasures in such areas as crash avoidance and occupant protection. I do not understand the full range of the agency's mission to be the subject of discussion here today, and I will concentrate, if I may, on summarizing four of the specific technology and hardware-based approaches the agency has taken.

I would first like to explain how we go about making decisions on the priorities that led to the undertakings which I am describing. In deciding which countermeasures should receive funding, we examine the magnitude of the safety problems facing the traveling public—that involves a very detailed analysis of accident data, including some accident data files which are only now for the first time available to the agency.

We look at national and local trends. We look at the impact of existing measures, including the impact of existing technologies and the performance of our existing motor vehicle safety standards, and we evaluate the potential for alleviating the problems by all known means available to the agency.

We select for priority attention those safety measures which seem to us to provide the greatest potential for solving the problem and which are the most cost-effective in doing so. Based on that kind of an analysis, our current top technology projects include improvements in occupant restraints, glazing, steering assemblies, side impact protection, lighting, instrument panels, including particularly the glove compartments, and heavy vehicle braking.

I have spoken before the committee, as early as in my confirmation hearings, about the first of the specific technologies that I would like to mention here today, air cushion restraints, more popularly known as airbags. I testified last March at a hearing held by the Subcommittee on Taxation and Debt Management, on legislation which you had introduced then and have reintroduced this Congress, to encourage the installation of airbags in new cars by American automobile manufacturers.

At that time I indicated that, while we were ready, willing, and able to consider the ways in which it would be appropriate to address this kind of question—that is, what specific economic incentive might be appropriate—we were not at that time in a position to recommend which way would be preferable. The alternatives were to help to underwrite development of the technology by the manufacturers by relief directed to the manufacturers, or the approach taken by your legislation, which would be addressed to subsidizing the purchase price of the airbag, either for the consumer or for the manufacturer.

Based upon our continuing analysis of this kind of a question, we believe that the approach that the legislation takes, focused on the purchase price, would be the more appropriate of those two approaches. We still have, of course, reservations about the precise dollar values that should be involved and many questions about the specifics of the program.

But at least insofar as that threshold question is concerned, it appears to us that that would be the preferred approach as between the two that we identified last year.

Since last year, indeed since 1981, we have been negotiating with manufacturers in effect to regain ground and to obtain, voluntarily, commitments to continue with the development and pursue the orderly introduction into the marketplace of airbags. As you know, formal contracts to that effect had been entered into by Secretary Coleman in 1976, which were abrogated in 1977 by the Department's adoption of the mandatory passive restraint requirements of motor vehicle safety standard 208.

As you know, we have had some public success in this area, Mercedes-Benz of North America has announced that beginning with model year 1984, without the need for any formal agreement—Mercedes will be introducing that technology in the American market.

We have done two separate things within NHTSA to insure that this technology is introduced. The first was directed toward the maintenance of the supplier industries for the technology while the remaining developmental work continued and while the industry, in effect, geared itself toward production.

That is represented by the approach we have taken to use R&D funds to achieve the retrofitting of airbags into three models of vehicles commonly used for State police use. That effort, which should be in operation this calendar year, contemplates the selection of several state fleets and the retrofitting of driver-side only steering column airbags, to the benefit of the vehicle drivers. Of course, that retrofit capability will be available from the supplier to any member of the public who wishes to purchase similar vehicles directly from the auto manufacturers.

The second element of NHTSA's involvement in this area over the past year-and-a-half or 2 years has been directed toward the actual introduction of original equipment air cushion restraint technology. That is represented by the agreement formally signed yesterday with the General Services Administration whereby, beginning in model year 1985, or earlier if possible, the Government will include in its contract specifications for purchases of compact cars the requirement, and detailed specifications for the inclusion, of air cushion restraints.

Those requirements should go out for bid this spring. They are part of our budgeting. NHTSA will bear the cost of the airbag system. GSA will actually implement the program. That will insure that the bidders on that program and the suppliers of that system will in fact be auto manufacturers supplying original equipment airbags in one or more lines of cars. That will make them available on a broad scale to consumers.

The second element I would like to address very briefly is our new car assessment program. The committee I know is familiar with it. It is more commonly called the crash testing program. It was initiated in 1979.

We have continued it, and from the standpoint of making optional safety technologies available to the consumer, I think the record of the performance of vehicles in that program is informative. Virtually across the board, performance of vehicles in the program, over time, has improved. That means in the concrete sense that it is possible for designers to design a car so that it will perform in a superior way in that testing program.

As you know, the comparisons between actual road experience and crash testing remain to be validated. But at the very least, we know that one can design for superior performance in that kind of a crash.

At the same time, we have begun for the first time this year to include in the testing program light trucks and multipurpose passenger vehicles. And finally, we have decided to resolve some of the objections and questions raised about the validity of the test results themselves by including for the first time repeatability and reproduceability testing. That involved the crashing of 12 identical cars by the government and 4 identical cars by the manufacturer of that car. We are completing our statistical analysis of the results and they should be available very soon.

Cooperative research has been addressed by earlier witnesses and was mentioned in your question to Chairman Burnett. I would like to point out, there has been some significant confusion on our cooperative research program and specifically on the issue of side impact protection. Side impact protection remains one of the highest technology-based priorities of the agency. There are four major projects currently underway. Only one of those projects, the one directed toward the measurement technology, is the subject of cooperative research. The cooperative research is addressed to the measurement technology, primarily because of the experience of the government with the adoption of the 208 standard. You will recall that the litigation which tied up the immediate implementation of the 208 standard back in the early 1970's was addressed to the



question of the measurement technology. That is what we are focused on. That is what we hope to resolve.

We have brought the RSV, as you requested. We are prepared to discuss in detail our ESV program, which I am also very proud of because of the degree to which we expect it to lead more immediately to improvements in production-line vehicles.

I might conclude by saying that on Monday we signed and sent to the Federal Register a notice of proposed rulemaking which would allow the use of Securiflex—that is a trade name, I should say—laminated plastic windshields, by proposing an amendment to the abrasion resistance requirement of our current windshield standard.

My prepared statement goes into each of these issues in very much more detail. It illustrates by specific example what we have done and what we continue to do with respect to improved safety options. Neither we nor the industry, nor any interested party, has ever had or will ever have all of the answers. Our commitment of resources and ingenuity at the government level to the search for constant improvements continues to be among our highest priorities. Our sole criteria is identifying and implementing what will work, and we have, I think, a substantial amount of pride in the research underway in the agency now.

We are prepared to answer any of your questions.

Senator DANFORTH. Thank you very much for your testimony and for the statement.

As you know, we have different points of view as to how to carry on your mission. I am sure you have a different point of view of how to carry on my mission. My view is basically this, Mr. Peck.

After a decade or more of various tests and crashing cars and all the things that are done to make sure what works and what does not work, if it develops that there is a very clear body of knowledge that a particular feature in an automobile is clearly a safety feature, would be clearly a safety feature, would save lives, and would prevent injuries, then why not just mandate that it be included in cars? That would be my view, for example, with respect to the airbag.

I think this is not a new idea. Airbags have been tested, developed, used. They have actually been installed in cars. Instead of sort of fooling around with it and putting it in some Government fleets, which is fine, it just seems to me that if you have a very, very good indication and a body of knowledge that a particular feature is the right one, just put it in the car, don't not negotiate with Mercedes.

That is fine, but not too many people are going to be able to buy Mercedes, and those who have them will probably be safer anyhow than those who buy a \$5,000 or \$6,000 car, if you can get them any more.

Mr. PECK. You will probably get a sharp vote with the remaining panel on that issue.

I certainly agree in general with your statement. As is always the case before the agency, regardless of who is the administrator or what is the administration, the specific issues are the ones that control. On this particular technology, as I think I have testified

before, our purpose in the program is not to demonstrate whether the technology works.

We know to a degree that we see in very few issues of automotive safety that it does work. The issue is acceptability and public understanding of it. On the few occasions in which the agency or the Government in general has attempted to mandate a technology that continues to be so widely misunderstood and, in this case let me say, underestimated by the public, I think there would be a legislative veto were we to mandate it by rulemaking.

As you know, any portion of motor vehicle safety standard 208 that involves compliance by the use of other than what we now call the active belt system is subject to a legislative veto. In all candor, I have to tell you that I think if I were inclined to mandate the technology it would be overridden. That is a very powerful consideration.

Senator DANFORTH. Why not leave that worry to us?

Mr. PECK. Well, that is tempting, and we have addressed this question as well.

I do not share your view that all of the issues have been resolved. With respect to the driver's side, I believe they have. But no one has ever considered, and I think it is unlikely that it would be considered by the agency, addressing only that as a mandate.

The 208 standard, the specific performance requirements laid out in it, continue to be very troublesome from a technological standpoint. One of the elements that we have taken into account in promoting the use of the technology is the degree to which those should be looked at.

I think in summary I have to say I concur entirely with your generic statement and have to disagree, respectfully, on the application of that to this specific instance. On the Securiflex question, for example, that was a case in which the agency was in effect required to address an amendment to an existing motor vehicle safety standard. There are similar amendments proposed now for enhanced lighting systems.

Where we have safety standards in place, the inertia in favor of retaining them, on the presumption of validity, is enormous. It took us literally, starting from scratch in January 1981, virtually 2 full years to resolve the windshield glazing questions, and in some cases merely to identify the questions, presented by the potential hazing, the potential scratching, the potential delamination problems that would be posed in the event of adding the interior plastic laminate.

None of these questions are easy. But as we have identified the options, the kinds of technology that are clearly beneficial from a safety standpoint, we have not hesitated to adopt them and to require them.

Senator DANFORTH. Now, I do not want to dwell on the airbag forever, but you say that you think that it is without question that the problems on the driver's side, have been worked out, if there were any problems, that there are no remaining problems and that it is clear that it would save people's lives?

Mr. PECK. That is correct. But the acceptability is still a critical element, and acceptability is something that, under the decided case law, we have to take into account. It is our hope and the pre-

cise purpose of the demonstration project, that the market which exists out there for this technology, which we believe to be substantial, but not by any means unanimous, will support the introduction of the technology in the only way that really makes sense, with a willing buyer and a willing seller, so that we do not have to face the acceptability questions and the misunderstandings.

It would have been extraordinarily easy for us to walk away from this at the conclusion of the 208 standard, as I know you are aware. We did not. We did not because of my belief, based on a review of all of the evidence before the agency, that this is a technology whose time has come, and my belief that it is not only marketable but can be successfully marketed.

Senator DANFORTH. How are you ever going to market it if, first of all, the auto industry does not want to advertise safety? I do not understand why they do not, but I know one of the auto manufacturers in this country had some pretty good testimony presented about it with respect to the bumpers, and after the hearing they approached the staff of this subcommittee and complained about the whole thing.

It is as though the auto industry by and large never wants to mention safety. They claim that it does not sell. And if the auto industry is not mentioning it, then who is going to?

Now, it is my understanding that the Department of Transportation in prior administrations had television commercials which they provided to the TV networks for public service announcements. We had one of them shown yesterday with respect to the RSV. That commercial is not being shown to the public by the Department of Transportation any more.

The Car Book, which was an effort to educate the public as to safety, is defunct. I do not know how this groundswell of support for airbags is going to come if the auto industry is not interested in advertising it, if the Department of Transportation does not want to advertise safety matters, and if the whole effort of NHTSA seems to be to move backward rather than forward with respect to pushing a variety of safety standards.

Mr. PECK. Well, Mr. Chairman, I have to disagree on each of the points you have raised. First with respect to the market for airbags, we know it is out there, because both we and the industry have done testing on it. And I should add that when I spoke of the problems with the driver's side technology having been basically solved, I should have qualified it to one very narrow degree. That is not the case with respect to the very small subcompact cars.

But in any event, we understand the motivations that exist in the marketplace for safety. I think you will hear from the auto manufacturers later on today that what has been usually described as their traditional attitude, that safety does not sell, is changing, in some cases has changed dramatically.

Some of the manufacturers are now, indeed, aggressively advertising the safety aspects of their products. All will be advertising the quality aspects of their products, because their perceived vulnerability in the marketplace as against foreign competition is focused on that.

With respect to the public service announcements on safety, I do not believe we withdrew any of those in use. But the point is, a

public service announcement on a 2- or 3-year-old single item of equipment, such as the RSV, has a limited value. You can only show that so many times. We have not terminated showing the RSV. We have not declined permission, except in one instance where a commercial purpose was understood to be the case.

The fact is, that specific project was completed and produced a product which was advertised, received significant publicity, and even now continues to receive publicity. It is downstairs for your inspection this morning.

As far as the Car Book is concerned, it was always understood to be a dated product. It is not even indicated in the Car Book what model year cars were crashed. There was never any thought given within the agency at the time of publication to its continuation. What we then did was a marketing survey of the Car Book on what people need and want to know about cars, including safety, and what we have done is generate a program which is more sharply focused on what people want to know.

Every element of data that the Government has that was in the Car Book is available now through the Hot Line in a much more updated and much more complete form, and we are constantly improving that system. We are improving the system for this reason: We agree entirely with the thesis that the most efficient way to achieve results in any area, especially in safety, is if they can be achieved through the marketplace.

We know from our Hot Line response, we know from the response to the Car Book, that the people are interested in safety. We see the manufacturers moving toward that. We are indeed aggressively promoting it.

Now, it takes time to do everything. Of the range of the agency's work, I think the area where I am still not satisfied with our progress is in the area of the Hot Line, in the area of the comprehensibility of crash test results and things like that. We are constantly improving that, under a contract, and upgrading the entire organizational structure within the agency that handles it.

The point is, if you can do it through the marketplace, it is the easiest, the fastest, most efficient way to do it.

Senator DANFORTH. I do not see how you are going to conceivably do it through the marketplace if you have an auto industry which is truly resisting advertising on safety and has historically, and which seems to resent even congressional hearings dealing with safety. Also, if you have an agency of the Government which is charged with responsibility in safety which is not really advertising the availability—you are talking about buckle up campaigns and so on, but not with respect to technology—when you are withdrawing standards on bumper safety and so on.

Mr. PECK, I am sure you are a committed person, I really am. I just do not know how we are making any progress. I think it is just an absolutely useless undertaking if—other than the windshield—we proceed neither with mandates nor with even a very good educational program.

Mr. PECK. Mr. Chairman, we are not withdrawing from mandates. That was neither my testimony nor is it our belief.

Senator DANFORTH. It is your history.

Mr. PECK. Mr. Chairman, when I inherited this agency I found a lot of stuff thrown out the back door into the Federal Register during the last 20 months of the prior administration, for which the agency had no adequate data to support notices of rulemaking or advanced notices of rulemaking. Whoever succeeded the previous administration was going to spend a good deal of his first 2 years in office undoing some of that damage.

As far as new rulemaking is concerned, we have gone through every agency rule or element of research to identify those where we can move. I might point out that all of the work done on Securi-flex was done beginning in this administration. I might point out that for the very first time in the agency's history, in this administration we did an injury mechanism study to determine what we should be looking at, and discovered at least a couple of areas that the agency had never even considered looking at.

We are moving aggressively, but research takes time and everything that could have been promulgated, based upon what we had in house or had any reasonable prospect of getting, was either in existence or had been proposed. Everything that will be promulgated that we have identified or that was identified by the prior administration and that we are continuing the efforts on have yet to reach the stage of final promulgation, but that is an accident of history.

Senator DANFORTH. Why do we not have a 5-mile-an-hour bumper?

Mr. PECK. Because the study initiated by Joan Claybrook in 1977, published in April 1981, established that it did not meet the statutory standard, that is why. There is not a favorable cost-benefit ratio. And that statute, unlike any other, first, is not based on safety but consumer protection; and second, unique to this agency, requires that we adopt that standard which produces the "maximum feasible reduction in cost."

That is not cost-benefit, which would give me broader administrative discretion. What the statute says is, I can adopt a bumper standard up to the point at which a dollar spent gets back at least a dollar in return, but above that point——

Senator DANFORTH. What does that mean? Does that mean that somehow the law has locked in the cheapest bumper we can possibly put on a car?

Mr. PECK. No, but the law has locked in the bumper which produces the maximum reduction in cost, and the difference is this. When you calculate cost-benefit under all of our other standards, we are governed by our general statutory responsibilities under the APA. We are able to pick, in a grey area, where the standard level should lie, and the test is reasonableness.

In this case that statute says "maximum feasible reduction in cost." We looked at, in the regulatory analysis that followed the publication of the final evaluation in April of 1981, all elements of cost. On the cost side, the cost elements that go into a bumper system are the materials, the weight, primary and secondary, the maintenance of the car and of the system, the repair of the system in the event of damage, and eventually the cost of insurance for that system.

On the other side, the cost of a similar system at a different impact speed involves those same elements and the difference between them, taking into account an increase in damage, an increase in repair costs, including time, including delay, including the cost of estimates, including any increase in insurance attributable to the difference.

Based upon all of that analysis, our conclusion was that as far as the entire cost of the system is concerned, the 5-mile-an-hour standard was on average per vehicle \$28 more expensive than the 2.5-mile-an-hour standard.

Now, I am not saying the cost was in that range. I am saying that the difference between the total costs for the systems was \$28 per vehicle. I have read with great interest materials submitted to the committee with respect to crash testing of cars alleged to have 2.5-mile-an-hour bumpers and the dramatic high dollar values attributed to the repair. The repair cost is only a very tiny part of the question because it must be balanced off against other cost, including the cost of the repair of the more expensive 5-mile-an-hour system. It only takes into account one tiny but significant element of the overall cost of the systems.

The point is that for average vehicles with bumpers designed for a 2.5-mile-an-hour system using new technology, the difference in cost that we have established has not been successfully challenged, and indeed represents the insurance companies' own values taken at a conservative level in the regulatory analysis.

Put another way, it is irrelevant to the agency by law that there may have been damage to any particular car, and it is irrelevant to the agency's consideration under that statute that any particular car bumper could perform better or worse than a prior.

I might add as well that to our knowledge——

Senator DANFORTH. It is irrelevant which bumper performs better?

Mr. PECK. It is irrelevant to this question which bumper performs better in that kind of a test.

Senator DANFORTH. That has got to be a crazy interpretation of the law.

Mr. PECK. No, no, I am sorry.

Senator DANFORTH. It is irrelevant which bumper performs best?

Mr. PECK. That is correct. The dollar values involved in each are relevant, but as between any two that is not the test that the agency must apply. The test the agency has to apply is the maximum reduction in cost, not the best cost-benefit result, which would allow us to adopt a standard that provided for a greater level of protection without a proportionate increase in benefit.

Senator DANFORTH. Well, maybe we should change the law. I will have to look at it and analyze it from the standpoint of what the statute says. It just seems to be a remarkable bit of legislation if we provided that the cost of the bumper, as opposed to the utility, was what was to be considered.

The testimony that we had is that up to maybe \$300 or \$400 an accident, I cannot remember the figures, but very substantial amounts per accident was the differential between a 5-mile and a 2.5-mile-an-hour bumper.

Mr. PECK. What I said was that that result with respect to any particular car is irrelevant to the test required of the agency under the statute. There will be cars that will suffer greater damage under the lower bumper than under the higher bumper. But on the vehicle fleet average, which was all we could go on under the statute, that is more than taken up by the difference in the kinds of accidents, the difference in the numbers of accidents, and the difference in the kinds of cars involved over the whole fleet.

And I might say that, with regard to changing the statute, with great respect, Mr. Chairman, the Senate already voted to change the standard from 5 to 2.5 miles per hour in 1980, and it failed in conference. The only recent legislative enactment on this matter was by this body, and it was to do by statute exactly what the agency has now done by discretion. In 1978 the agency was directed by the report of the Senate Appropriations Committee to change the standard in accordance with the result of that April 1981 study.

The difference really is that we have to look at life-cycle costs versus single incident costs. Even if you were to assume that the evidence submitted before the committee in prior sessions did in fact reflect 2.5-mile-per-hour bumper performance, it is only one tiny corner of the issue and it is not the determining factor. Life-cycle costs are the determining factor, and we have not seen any figure that would cause us, even on reconsideration, to change the economic analysis that was started in 1977.

Senator DANFORTH. Do you view the role of the National Transportation Safety Board as being duplicative or supplementary to what is done by your agency with respect to motor vehicle safety?

Mr. PECK. Essentially supplementary. I was going to mention earlier, in additional response to your question to Chairman Burnett, we are by statute required to take into account and respond formally to all recommendations of the NTSB. We have in general found them to be extremely helpful.

I know Chairman Burnett has suffered some budgetary cutbacks and we are supplementing what formerly would have been research performed by the NTSB, and we do so gladly and willingly.

Senator DANFORTH. In your efforts to improve safety on a cooperative basis with the auto industry, have you found them to be cooperative? Have they been good partners in your effort? Have you gotten as far with them as you would like to?

Mr. PECK. Within reason, I think. They are still a regulated industry, we are still the regulators. I think it is fair to say that their view of what we should be doing on any given point—and I do not speak with specific reference to the cooperative research—differs markedly from the agency's view or my view and always will.

I do find, whether as a result of product liability, which is exploding in this area, or as a result of a marketing perception that now in a more modern sense understands the value of safety as a sales tool, that certainly at the engineering levels, all of the companies, are interested in safety and in improving safety. And I find very little evidence of anything like either intransigence or even inattention to safety questions.

As I said, we will never agree with them and we never should. I would be nervous if we wound up agreeing with them.

Senator DANFORTH. Wherein do you disagree with them? Where have they fallen short of the mark?

Mr. PECK. In the areas of regulation. Obviously, when we propose a standard it is going to be expensive, and if there is any doubt in their minds they are going to oppose it. I think it is fair to say that, on the high-mounted stoplight program, which we have just incorporated as well into an agreement with the General Services Administration and which the agency is prepared to move on, there has been very strong industry opposition, resistance even.

Senator DANFORTH. To putting it in even GSA cars?

Mr. PECK. No; the idea of mandating it across the whole fleet.

I find on the industry side of the question there is usually a reasoned engineering basis behind the argument. It is not just a cheapness question or a safety compromise question. In general we have found with respect to some of the specific things that we did a high level of support for the appropriate aspects of safety.

On some of the things that we adopted by way of regulation, for example on the speedometer-odometer question, we have had across the board at least nominal support for retaining most of the requirements of the original standard as it was originally promulgated.

On things like the steering assembly, we have a standard. We had not gone back to reanalyze. When we looked at our fatality and severe injury data, we discovered these systems were not performing as well as expected. The companies are certainly not anxious to have to go back and revisit that question, but they are. And the research that we have underway within the agency, which is different from the research underway within the industry, is addressed to that question.

There will never be anything like cooperation across the board, and there can never be a crossing of the line between the regulator and the regulated industry. But I do find, on the general question of safety, that their commitment appears to be borne out by their current research projects and by what we understand to be their current manufacturing plans.

Senator DANFORTH. Senator Riegle?

Senator RIEGLE. Thank you, Mr. Chairman.

What does your data tell you in terms of what the effect of mandatory seat belts might be, say, versus airbags in the way of protecting people in crash situations?

Mr. PECK. By far the most effective and efficient protection would be to have everybody in a three-point belt system. Across the board it is at least as effective and efficient in preventing injuries and deaths as any other technology.

At high-speed crashes, the airbag appears to offer superior energy distribution across the full horizontal plane of the front of the occupant. In low-speed crashes, belt systems appear superior because they don't involve some of the risk of minor injury that the air bag deployment involves.

Senator RIEGLE. Is there a reason why you have not asked for a mandatory seatbelt law, then?

Mr. PECK. Well, at the Federal level I personally and the agency historically has had very grave reservations about the propriety of a Federal mandatory belt use law. As you know, in the late 1970's

the Congress adopted a supplementary grant program for States which adopted that kind of a law. It was not funded beyond the first year. Only one eligible recipient made any steps toward doing it and that was the Commonwealth of Puerto Rico.

At the State level, of course, in your State, in Michigan, there was a very aggressive campaign. We did indeed participate in that. We supported the adoption at the State level of that law. It was one of the questions that I wish you had asked Chairman Burnett about. We have actively supported, in testimony and appearances before legislative committees, child restraint legislation, which is already in force in 22 States and the District of Columbia and adopted and to come in force in 6 additional States.

There is no question that whatever technique will get people behind belts would be effective, and that is one of the most exasperating parts of explaining and trying to convey the difference between the 208 mandatory passive restraint standard and this kind of an approach, either of these kinds of approaches.

Our problem with the passive restraint standard as it was drafted was it was not going to achieve this result. Historically, if you look at other nations' experience where they have tried to increase belt usage, levels of usage in the range of 60 percent are achievable through education, through a massive infusion of direct support at the national level, whatever the appropriate jurisdiction would be.

But the last 15 to 20 percent of usage, even in those nations which have high usage rates, is achievable only where there is a mandatory requirement to use which is in fact enforced or in fact complied with.

Senator RIEGLE. What is your estimate of the rate of usage now of seatbelts?

Mr. PECK. Well, we are about to release the results of our latest survey. We have an ongoing project which is——

Senator RIEGLE. Let me just—I do not want to stop you, but there are several things I want to cover, so I am just wondering—let me get into the detail if I want to, but what is your percentage estimation of the usage of seatbelts now?

Mr. PECK. The last major national statistically valid number showed between 10 and 11 percent.

Senator RIEGLE. Ten and eleven percent. So we have got—most of the cars on the road today would have seatbelts in them, would they not?

Mr. PECK. That is correct. And as within the fleet, usage in small cars tends to run 17 or 18 percent and in large cars about 7 percent. And our current numbers, if they hold as we scrub out anomalies to preserve the statistical validity of the numbers, would show a substantial increase in that 11 percent.

Senator RIEGLE. I am just wondering, when people have this kind of safety device in their cars, they are paying for them and they are there, they are available for use, we know they have a very beneficial effect in crash situations in terms of saving people's lives and reducing injuries, why that is not the most cost-effective route for us to take in terms of really a whole new effort.

I am talking about an effort that would require initiatives by the President, perhaps spending some additional money, perhaps calling for new laws if that is what it takes to get this done. It seems

to me that we are putting effort into other ways of trying to deal with more or less the same problem, when in fact we have already taken a step to see that we have got seatbelts in cars and they are there now and they do work when people have them on.

But to recognize that only 11 percent of the seatbelts are being used, according to the most recent data that we have, which is another way of saying that 89 percent are not using them, I think really is a failure of policy, and that if our goal here is to try to reduce injuries and loss of life that a major effort is needed along that line.

Would you not agree with that? Obviously, what we have been doing has not worked in terms of either publicizing the value of that equipment or looking at the cost of not using it.

I think it is interesting. As you say, there is a contradiction here, with States now moving to require restraint systems for children, for infants, which I strongly support, to somehow see that trend developing but yet to accept what is really, I think, a massive shortfall here on the side of using seatbelts that now exist for adults in cars.

What can be done here to really change this in a dramatic way?

Mr. PECK. Well, our experience with what has happened in other nations has been that their efforts have been addressed to adult protection first. We seem to be unique in addressing children first.

Second, such efforts have always been preceded by a significant educational campaign. We have done a great deal of research into the question of why people do not wear belts and what could cause them to change that behavior. Mandates of any kind come in very low in terms of actual effect according to that research.

We have not made a decision on the question of a mandatory belt use law. It is one of the issues that——

Senator DANFORTH. You say mandates come in very low?

Mr. PECK. That is right, negative incentives do not——

Senator DANFORTH. Do not work?

Mr. PECK. They have not in general worked, that is correct. It is one of the major confusions we had with one of the other committees of both houses over the issue of whether there should be a mandatory usage requirement within the Federal Government. Mandates will increase usage, yes. Mandates, given an acceptability and a level of understanding laid on top of usage, will be the maximum usage level at any given point. But mandates, first, alone, are very difficult to implement and do not show any major promise, in the early stages at least.

So what we are doing is addressing the question which gets to the heart of the real issue. It is one of the premises of your question, Senator, which I have to say we do not believe, that people know belts work in crashes. We have discovered that to an astonishing degree people not only do not know how they work, but do not believe that they would be effective in crashes.

Senator RIEGLE. Well, let me just stop you there. If that is the issue, then why are you not spending your money and focusing your effort in a massive way on that specific point? I mean, if that is the issue, what are the signs that it is being done? What percent of the budget goes for that effort?

Mr. PECK. Well, it depends on whose numbers you read. We have \$9 million out of the agency's program itself. If you include all of the salaries and overhead of the agency, the carpeting, the bookcases, what have you, the total that was projected by GAO for 3 years for the belt program is \$27 million.

We have had, at the request of subcommittees of the Congress, a major evaluation of our safety belt program done by the GAO, and we came very close to complimenting the GAO and offering not even constructive criticisms on it, because it is a very thorough analysis of the issue.

But that is precisely what we are doing. The safety belt education program is addressed to active and passive restraints, addressed to belt use with air bags and addressed to child restraints is—

Senator RIEGLE. How much are you going to spend on it, though? How are we going to get this message across? Are we talking about a token effort? Are you talking about a major national campaign?

Why would you not be well-advised, for example, to enlist the President in this? I mean, he is a very effective communicator, and I am serious. I mean, he is the leading spokesman in the administration, the one who can help drive this message home. Why do you not think in terms of even asking the industry if they would not participate, perhaps even on a cost-sharing basis, put some money into a pot to get this job done?

Because it seems to me that it is in everybody's interest if we have got equipment in the car now, we know it works, it is the most effective equipment that we have found so far, we have got only 11 percent usage rate, we have got 89 percent of the people not using it.

You say that you do not like—you are not sure about mandatory requirements. I understand that in Australia, where there is a mandatory seatbelt law and where penalties are assessed, that the usage there is estimated to top 50 percent. Now, that is a pretty good performance. That is a lot better than 11 percent.

Have you asked for more money? Have you asked the administration for more money to really get this thing moving? Or dare you ask?

Mr. PECK. Mr. Chairman, we have asked, but we have been cut back in our budget request by the Appropriations Committee. We have been cut back each successive year, and the original purpose of the GAO report to which I just referred was to establish that we were asking for too much.

With respect to the President's involvement, he announced the program last April 14 in the Rose Garden, in a ceremony which got extensive coverage. He has done a public service announcement which is being shown in all of the major markets.

With respect to industry's involvement, in the last calendar year they spent on their own \$9 million in paid commercial announcements with respect to belt usage.

All of these are very significant elements of the program, but they are educational and they are groundwork to prepare the way for the outreach of the program.

Senator RIEGLE. I hear what you are saying, but I think the bottom line is what the utilization rate is. The fact of the matter is

you have got an 11 percent utilization rate nationally, and you have got the equipment in the cars available for use. You know it works. People have already paid for it. It is very cost effective.

I do not think a one-shot announcement, whether it is in the Rose Garden or where, is sufficient here. I think if you cannot boost that rate from 11 percent up to 30, 40, 50 percent, then I think you will have fallen short of what you should be doing.

Now, other nations are doing it. Why can we not do it?

Mr. PECK. We are not only doing it, Mr. Chairman, we are doing it substantially faster than other nations have done it. I alluded just a few moments ago to the increase which even our national statistics, which are ruthlessly designed to prevent being affected by this kind of a program, will show a usage increase in the range of 20 to 25 percent over the last measured usage.

In our specific program areas where we have identified markets during the first year of preparing for the program, we have increased usage into the high 40 percents, for example, in some high school populations. There are currently cities in which usage rates exceed 30 percent, and this is really before this program was begun.

I cannot emphasize too strongly how deeply we are committed to this program and how substantial our resource requests have been. As I said, the administration's request for this program has been curtailed very substantially by the Appropriations Committee in the last 2 years, and we are hopeful that the submissions that I made to the Appropriations Committee the week before last have resolved some of their concerns over precisely the opposite tack of your question, which is that we are going too far and being too comprehensive.

Senator RIEGLE. Well, I would just say, I want to get to another point here, but in terms of spending priorities we hear from the administration all the time, those of us who sit on this side of the table, and the things that they feel strongly about they press very hard for. You are seeing a full court press on the defense budget right now, ranging from full-page ads to special booklets and presentations and so forth and so on. And I think it is fair to say that there has been no great push in behalf of this kind of funding level to get this job done.

This has not been assigned a top priority insofar as I can judge. I am talking about in the overall scheme of things by the administration. And I think that is a fair comment.

Mr. PECK. I assure you I will carry that back and endeavor to change the impression you have.

Senator RIEGLE. Well, I think it is an important area of concern and I think we can save a lot of injuries and save a lot of lives and a lot of heartache and a lot of economic waste as well by something that we already have. And I think when other countries have managed to achieve performance levels way beyond ours, it is time for us to realize that we have not done enough and that we ought to do more.

I am open to any ideas, including requirements that this equipment be used.

Mr. PECK. I could not agree more.

Senator RIEGLE. Let me ask you one other thing. What has been the level of cooperation that you have found in whatever contacts you may have had with foreign manufacturers?

Mr. PECK. In general?

Senator RIEGLE. Well, respond either in general or in specific. What has been the history there? Have they been quite eager to be responsive to ideas with respect to safety? Have there been any—

Mr. PECK. I think you can't distinguish in fact among foreign versus domestic manufacturers on the overall question. Our safety standards in this country are to a significant degree more stringent, or perceived to be more stringent, than virtually any other nation's. So there is a constant impetus from abroad toward harmonization in the sense of reducing differences among safety standards that is, changing ours.

That is a generic fact of life. It operates through the United Nations and the ECE Committee, WP-29. It generally addresses very specific items, braking, lights, things like that.

As far as the manufacturers themselves are concerned, each individual nation has its own regulatory system and any differences between the regulatory systems that the manufacturers perceive, their domestic systems versus ours, produces pressures to change.

Senator RIEGLE. I have seen data, for example, that would suggest that American cars are relatively safer than certain imported cars. Apparently it varies by size and classification. But in the earlier discussion there seemed to be a sense that maybe you were not entirely satisfied from the response from time to time that you had gotten from domestic manufacturers. I do not know if that was your intent to say that, but I think I caught a flavor of that.

And I am just wondering if you had had a different experience with, say, the Japanese manufacturers? Have they shown a great interest in the safety issues and have asked what they might do to make their cars safer?

Mr. PECK. No greater, I think, than the domestic manufacturers have.

I think there are two impressions abroad, diametrically opposite, as to whether there is a safety difference between domestic versus foreign cars. My impression is that the foreign manufacturers, particularly the Japanese manufacturers, are acutely aware of the perception that they may in fact be incurring economic damage at a higher rate than domestic manufacturers might be.

As I say, there are two views. It depends on which set of data you look at. But I think that they are sensitive to the issue. We certainly have found in some areas—

Senator RIEGLE. Well, it would not just be economic damage. I mean, if economic damage is higher certainly, presumably, the human damage is higher; is it not?

Mr. PECK. No, that is not something we can substantiate, although the data we would need about accidents is, in relative terms, really too new to reach formal conclusions. We do not see in our accident data alone substantial differences among manufacturers or among nations of origin.

The major discriminating factors among injuries and rates of fatality remain size of car, weight of car, things like that. We cannot point to any accident data which would demonstrate a superiority,

one over another. If you look at the crash test data, you have a fairly constant improvement across the board.

And I was remiss in not mentioning this fact in my response to Senator Danforth's earlier question. One of the clear examples of ways in which the industry has moved in response to agency initiatives has been the rate of improvement in performance of vehicles in our crash test program, the new car assessment program.

In fact, we cannot distinguish based on accident data, in part because we do not have enough accident data, but also in part because what we do have does not allow us to distinguish with statistical validity among the performance of cars.

As far as attitudes are concerned, I find across the board that issues such as product liability are driving manufacturers uniformly toward increases in safety and toward an apprehension of any perception that they may not be interested in or in fact utilizing the state of the art of design.

Senator RIEGLE. Maybe you need more data. I would think that when imports are up in the 25- to 30-percent range in terms of the percent of the market sold, that you ought to really take a close look at that. I would if I were you. I mean, I would want to have a data base so that I could talk about it in detail and know what I was talking about.

Mr. PECK. We do indeed. The system that we use for this is called the national accident sampling system [NASS]. The NASS system has really only been in place for a significant number of sites for about 3 years now.

We published in early 1982 the first summary of the 2-years worth of statistical data. There are 51 sites now. Basically what it does is take a statistical sampling of all accidents and send professional accident investigation teams to look at them in great detail, in depth. That is by far the best data base ever designed for this. It is unique in the world, and it is now in place in 50 sites. And the problem now is it has not been there long enough for us to have a sufficient body of cases.

We take about 9,000 cases a year and we now have a total of 12,000 cases that have been analyzed. We are capable, with that data base and that maintained by the University of North Carolina, of looking with very great discrimination at accidents.¹

Senator RIEGLE. Could you provide the committee with a copy of that report.

Mr. PECK. Sure.

Senator RIEGLE. And let us have a look at it, both in terms of economic loss, whatever measurements you have of that, plus injuries and any other variable that you are measuring here that might be helpful for us to see.

[The following information was subsequently received for the record:]

FOREIGN AND DOMESTIC CAR ACCIDENT EXPERIENCE SUMMARY

NHTSA has no study specifically comparing domestic and foreign car accident experience. Out analyses supporting vehicle safety design have compared the safety

¹ *The Report on Traffic Accidents and Injuries for 1979-80* and *The Economic Cost to Society of Motor Vehicle Accidents*, were submitted to the committee for the files.

records of cars with different design characteristics—different sizes, or different steering column designs, for example—to enable us to analyze the safety effects of these design differences. These analyses have been independent of the car's manufacturer or country of origin.

We have compared the accident performance of individual makes and models as a possible means of providing vehicle crashworthiness information to consumers. The best effort along these lines is the attached "Methodology of Make-Model Analysis."¹ Though this study did calculate fatality rates by model/model combination, based on fatality data from the Fatal Accident Reporting System and registration data from the R. L. Polk Company, the study concluded that serious obstacles remained before these rates could be used to compare cars. In particular, the study was unable to separate vehicle crashworthiness from driver and environment factors. The study summarizes its conclusions on page 30.

"The Fatal Involvement Rates calculated as shown in appendix A are not suitable for use in comparing the engineering safety merits of various cars. The rates shown contain errors in basic data, in computations, and the comparisons are not statistically sound. Further, these rates are contaminated by inclusion of effects of other factors than engineering, such as sales rates, driver behavior and environmental conditions, which precludes strictly engineering comparisons. More detailed calculations which can concentrate on engineering comparisons will be possible when the necessary data (primarily exposure data) become available."

We have been unable to acquire more detailed exposure data. In addition, any study using accident data would not be publicly available until at least a year or two after a model's introduction, and would thus have limited usefulness for new car buyers. As a result we have based our consumer information program on the crash test results of the New Car Assessment Program rather than on accident data analyses.

Mr. PECK. We are about to publish the first updating since 1975 of our societal loss study. It will show that the annual loss to our economy, our society, of automobile accidents expressed in 1980 dollars is \$53 billion per year. It excludes transfer costs, and that is an enormous amount. That is just the net drain. Paying a doctor instead of an upholsterer for a new couch, for example, is not taken into account.

Senator RIEGLE. Thank you.

Senator DANFORTH. Just listening, it occurs to me that if exhortation is the key to our buckle up campaign, one cost-effective way of doing it would be, now that inflation is under control, to get out those old WIN buttons, the "Whip Inflation Now" buttons, and resurface them with the words "Buckle Up." And we could get all the Federal employees to wear them.

Mr. PECK. Mr. Chairman, every time I mention the fact that we considered putting "Confucius say, man who wear seat belt will save face" in fortune cookies, I get beat up something fierce for being frivolous. But we will look at the buttons.

Senator DANFORTH. I do want to say this. I think the reason Congress has not appropriated the funds is that the idea of trying to exhort people is viewed as silly. That the role of Government in safety is basically preaching at people and exhortation is really kind of silly. There is a limited amount of change in attitudes and performances that can be accomplished over a long period of time.

But there is no substitute as far as Government policy is concerned for designing cars with known safety features in them. That is precisely what you and thus far this administration has been reluctant to do.

Mr. PECK. Again, Mr. Chairman, if I could sum up all of the testimony, my testimony, it could be focused on just that. We have

¹ A copy of this report has been retained in the committee files.

now a 10.2-percent decline in fatalities over the last year. That comes on top of the 3.4-percent decline in the previous year. No technology change existed during that period.

If ever there had to be proven the case that the way in which people drive, whether it is the people who are driving, the trips they are taking, or the manner in which they drive, does in fact make an enormous difference, it is that single statistic. There is no technology explanation for that change, and it is that potential which we are very aggressively pursuing.

Senator DANFORTH. Well, let me say, I bet there is another explanation other than exhortation.

Mr. PECK. There are a large number of explanations. We have ruled many of them out. But my point is, if ever we needed to prove to anyone, even the most adamant believers in a hardware-only approach, that other approaches will also work—not instead of but also work—and afford great potential and realizable potential for saving lives, the history of the last 2-year record in highway safety should establish the case.

We are not doing hardware. We are not doing technology. What we are doing is everything. I will throw the kitchen sink at this problem to save lives, and if it means running the risk of being accused of being silly, I respectfully say I am willing to take that risk if we can save lives doing it.

Senator DANFORTH. I do not think that this is saving lives. I think that you are undoing hardware and undoing technology. My guess is that the reason for a reduction in traffic fatalities is a combination of tougher drunk driving enforcement and probably less miles traveled.

Mr. PECK. No, that is not the case. The vehicle miles traveled is remaining stable, and although we can document in a couple of states specific programs which show positive progress, that is only a tiny part of the difference.

Senator DANFORTH. Well, I would like to keep you for longer, but we have seven other witnesses and I have to leave at 12. So thank you very much for being with us.

Mr. PECK. Thank you, Mr. Chairman.

[The statement follows:]

STATEMENT OF HON. RAYMOND A. PECK, JR., ADMINISTRATOR, NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

Mr. Chairman and Members of the Subcommittee: I am pleased to be here, today, to discuss what the National Highway Traffic Safety Administration has been doing and can do to make improved automotive safety available to the public. This is a particularly exciting and challenging time for the Committee and the nation to be addressing this question.

It is an exciting time because our national highway fatalities for 1982 were at their lowest level since 1963. More importantly, the rate of fatality, which takes into account how much people are driving as well, has fallen from its 1979 and 1980 high level of 3.34 per hundred million miles to an all time low of 2.82 per hundred million miles.

It is also an exciting time because for the first time in the modern history of the question highway safety has become a national public issue of major importance. Media attention to the problem of the drunk driver and sharp Congressional and Executive Branch focus on this issue and that of safety belt usage have directed new levels of public awareness to the single most important fact that drivers and occupants need to be aware of as they take to the roads: they are at great risk, they are vulnerable to accident, injury and death. They can in fact become, at virtually any-

moment on the road, a part of the national statistics that for years have represented one of the nation's most serious health problems.

This awareness, this healthy apprehension, has undoubtedly contributed much to the domestic declines we are seeing in virtually all categories of fatalities.

And it is in this respect that the current highway safety question is a matter of the gravest concern to this Agency and the Department, and presents the greatest challenge. Current prevailing conditions can not and will not continue indefinitely.

As public attention wanes, as economic dislocation eases, as possible current constraints on the types of driving that present the greatest risk relax, we face the major threat that these statistics will again reverse themselves.

This Agency and the Department are absolutely committed to prevent this result. We are determined that NHTSA's own dire predictions of future fatalities, announced in 1981 and based on conditions which prevailed as recently as three years ago, not come true.

The NHTSA addresses its safety mission in three basic ways: through its grant program to states for their highway safety program activities, through its operations and research activity addressed to crash avoidance, and through its operations and research activity addressed to the crashworthiness of vehicles themselves. The last two functions, of course, include our rulemaking and enforcement responsibilities. These are addressed to new vehicles through our adoption or amendment of federal motor vehicle safety standards, and to vehicles in use through our defect and recall authority.

Each of these areas is important, each directly affects the survival and safety of the American public, and each is being addressed by the Agency with renewed vigor.

I understand the particular focus of today's hearings to be what I have categorized here as crashworthiness. How safe the vehicles and equipment used in personal travel are now, and how safe they can be made in the future.

NHTSA helps to make improved automotive safety available to the public in two basic ways. The first is through the development of regulations which require the automotive manufacturers to provide new levels of safety performance. The second is by influencing the development and use of new technology. In each case the process begins with detailed analyses of the causes of motor vehicle accidents, injuries, and fatalities and an investigation of practical countermeasures.

In determining which countermeasures should receive national attention and Federal funding, we examine the magnitude of the major safety problems facing the traveling public, analyze accident data, consider national trends, look at the impact of existing safety measures, and evaluate the potential for alleviating each specific problem. Those safety measures which promise the greatest payoff and are cost-effective are then selected for priority attention. Based on this planning effort, I might note that our current top motor vehicle priorities include improvements in occupant restraints, glazing, steering assemblies, side impact protection, lighting, instrument panels, and heavy vehicle braking.

This record expresses the degree to which NHTSA is committed to automotive research and demonstration projects which assure continued progress toward reliable and cost-effective auto safety technology for the American car-buying public.

Much of the work and progress you will be hearing about today from subsequent witnesses is the result of, or has been stimulated or managed by, a series of research initiatives undertaken by the Rulemaking and Research and Development offices of NHTSA over the past two years. I would like to submit for the record copies of the work products of these efforts: the technical papers presented at the February 1982 and March 1983 International Congresses of the Society of Automotive Engineers.

I would like to submit as well copies of the technical papers presented by Agency representatives at the bi-annual Experimental Safety Vehicle conference in Kyoto, Japan in November, 1982, and the keynote address in which Deputy Secretary of Transportation Darrell Trent reaffirmed the agency's and the Department's commitment to technological advances toward safety.

AIRBAGS

Mr. Chairman, when I appeared last March at a hearing held by the Subcommittee on Taxation and Debt Management on your bill to encourage the installation of airbags in new cars by American automobile manufacturers through the use of the tax system, I emphasized how encouraged I was to see the serious consideration being given to non-regulatory alternatives to encourage the availability of air cushion restraints in the near future. As I noted then, although the Administration opposed that proposal (which you have reintroduced this Congress), it in fact helped to

change the focus of the airbag debate from whether the government could or should attempt to mandate such technology—it should not—to the question of how best to encourage its introduction.

I also reported at that time what NHTSA was doing to see that this technology is made available to any American consumer who may want to purchase it. I am pleased to be able to report major progress in this effort.

In late 1981, I began negotiations with manufacturers to gain their voluntary commitments to continue developing advanced occupant restraint technologies, and to offer some airbags as options. As you know, formal contracts to that effect had been negotiated by former DOT Secretary Coleman in 1976, but were abrogated when the Agency's passive restraint standard was adopted in 1977. In response to this initiative, and without the need for any formal agreement, Mercedes-Benz of North America recently announced that, beginning with the 1984 model year, it will offer a combination driver-side airbag and passenger-side pretensioned belt system as an optional supplementary restraint system in the American market.

This will be the first public offering of airbags as optional equipment since GM offered early airbag technology in model years 1974, 1975, and 1976.

Within NHTSA two air cushion restraint demonstration programs have been underway to demonstrate and ensure the availability of the lifesaving potential this technology represents.

The first project is a joint effort of the General Services Administration and NHTSA. The GSA has agreed to seek the procurement of 5,000 compact sedans for model year 1985 with original equipment driver air cushion restraints. NHTSA will fund the incremental purchase cost of these driver-only systems and will closely monitor their performance.

This demonstration is an effort to pursue automotive safety by means of incentive and example. By specifying such safety devices on vehicles purchased by GSA for government use, we believe the manufacturers will have the necessary major incentive and capacity to offer them to the general public as well.

In addition, NHTSA announced last November a second demonstration program by which driver-side airbags would be installed in 100 to 1,000 police vehicles to determine the feasibility of retrofitting systems into existing automobiles. The retrofit kits involved will be adaptable with minor hardware changes to Ford, Chrysler, and General Motors police fleet vehicles. Late model cars will be selected, since it is desirable that the systems remain in service for at least two years for evaluation purposes. The kits will be supplied by a government contractor and will be available for installation by the end of the year.

NEW CAR ASSESSMENT PROGRAM

These efforts are addressed to one particular technology, and one part of the crashworthiness problem. On a broader basis, NHTSA's programs to generate and disseminate safety information are basic to the Agency's ability to encourage making improved motor vehicle safety available to the public. Our goal is to capitalize on the manifest interest of the American consumer in motor vehicle safety issues by helping to ensure in the market place the kind of specific information needed to make informed decisions about purchases. Based on our experience to date, we have good reason to believe that success in this area fosters a healthy and necessary competition among manufacturers to produce equipment that is safer, more resistant to damage and less costly to service and repair.

For example, pursuant to Title II of the Motor Vehicle Information and Cost Savings Act, NHTSA has established the New Car Assessment Program. This is an experimental program addressed to the comparative safety characteristics of motor vehicles. It consists of 35 mph frontal barrier crash tests of a series of approximately 25 passenger cars each year. For model year 1983, we are expanding the program to include a small number of light trucks and multi-purpose vehicles.

Various injury-related measurements are recorded from instrumented dummies in the vehicles, and these data are published for consumers to use for comparing the relative crashworthiness of the vehicles.

Substantial improvement in crash test performance has been achieved since this program was initiated in 1979. For example, the program shows more impressive results for 1982 model cars than those produced in crashing 1979, 1980, and 1981 vehicles. In addition, a number of manufacturers that had vehicles which did not perform well in crash tests have subsequently modified their production vehicles to enhance their performance. Such voluntary modification by the industry of vehicle designs to improve vehicle performance in these experimental crash tests is an encouraging sign with respect to consumer influence in the marketplace.

This program has been controversial from the start, and much of the controversy has centered on the validity and value of such crash tests to predict on road performance. There are two important points which must be mentioned in this regard. First, the program consists of the data generated in a test environment and as such, may not be directly relatable to real world accident performance. Accordingly, we are conducting studies to assess the real world performance of vehicles as compared to their crash test performance.

Second, we have found some degree of variability in crash testing. To address this problem, we are conducting a Repeatability Program to assess the repeatability and reproducibility of 35 mph frontal crash barrier testing. The results of the Repeatability Program will help us to identify motor vehicle, test dummy, and test procedure parameters which contribute to the variability in crash test results.

COORDINATED AUTOMOTIVE RESEARCH

More directly focused on the auto manufacturers is our joint government-industry effort in automotive research which we initiated with the Motor Vehicle Manufacturers Association (MVMA). The principal reason for this program, which was first recommended in former Secretary Goldschmidt's January 1981 Report to the President on the U.S. Automobile Industry, 1980, was to expedite the development of practical solutions to highway safety problems. Additionally, by sharing motor vehicle safety research results and improving communication between the government and the private sector, we hope to avoid duplicative research. This effort is in addition to NHTSA's own research program, where priorities reflect both the latest accident data and projected fleet trends and our own rulemaking priorities.

It should be abundantly clear to most interested observers that far too many auto safety debates have in the past been conducted on a rhetorical instead of a factual level. Late in 1981, we began discussions with foreign and domestic auto manufacturers to explore ways of reducing the level of rhetoric and increasing the flow of facts. This project is the result, and the first concrete program that grew out of these initiatives was a program of coordinated research activities with the domestic manufacturers.

Early in 1982, after some preliminary discussions between the Agency and the Motor Vehicle Manufacturers Association, it was decided to approach the prospects for coordinated research "tentatively." Areas were identified where both parties intended to pursue research, and an attempt is underway to coordinate such efforts. For example, each party has agreed to conduct a test program on side crash protection research, an activity that is a high safety priority for everyone. A program of work was established that would ensure that both the Agency and the manufacturers would be able to share results of each other's research as it was completed. As information is produced, it is placed in the Agency's public docket.

The program is oriented toward the establishment of test procedures which could be used to assess side impact crash safety. It did not, of necessity, address vehicle improvements in this forum since such activities would on the one hand deal with proprietary data of the manufacturers, and on the other hand involve the development of the government's own regulatory priorities.

By June 1982, it was clear that the approach selected for the side impact program was productive and should be applied to other research projects. After exploring a number of possible projects, eight were agreed upon as worth pursuing:

- (1) Side Impact Research Project—Initiated March 1982 (accident data analysis, test effectiveness, injury criteria);
- (2) Truck Exposure Data Research Project—Initiated July 1982 (GVWR, engine type, brake type, cab type, axles, configuration, miles traveled, etc.);
- (3) Simulator/Instrumented Vehicle Research Project—Initiated August 1982 (analysis of man-in-the-loop performance measurement requirements);
- (4) CRASH/SMAC Review and Update Project—Initiated August 1982 (The velocity changes in the National Crash Severity Sampling Program will be reviewed and updated.);
- (5) Harmonization of FMVSS 108 Project—Initiated September 1982 (tail-light/stop-light intensity—expanding to other lighting areas);
- (6) Biomechanics Accident Reconstruction Research Project—Initiated September 1982 (development of a biomechanics accident reconstruction model underway);
- (7) Biomechanics Research Project—Scheduled to begin February 1983 (charter still under discussion); and
- (8) Steering System Research Project—Scheduled to begin March 1983 (Project will be discussed after Phase I of Side Impact Research Project is completed).

Most of these projects are underway and detailed work plans are being entered into the docket as they are developed. With this program in place in the United States, we have approached Japan and governments in Europe to see if similar cooperative research activities could be pursued internationally.

Since there has been some concern and even some misunderstanding expressed regarding this program, I would like to conclude this discussion by assuring you that this program does not in any way compromise the Agency's independent role. No industry representatives contribute to or share in the Agency's efforts, and no Agency involvement in industry efforts occurs. Only results are shared, to produce a more efficient, reasoned approach to solving the difficult problems we have before us.

EXPERIMENTAL SAFETY VEHICLES

At your request, we have made available for your inspection this morning two of NHTSA's Research Safety Vehicles (RSV). The various features and specifications of the vehicles are described in the attached Fact Sheet (ATTACHMENT A).

NHTSA has been at work for a number of years on improvements in vehicle design or construction that could compensate for some or all of the adverse safety consequences that flow from designers having to plan for managing crash energies in smaller and lighter structures. The RSV was an attempt to demonstrate that smaller size, relative safety, and levels of styling, comfort and performance commonly expected by owners are not mutually exclusive. It was a program which consisted of a series of contracts to design a small vehicle essentially from the ground up, with totally integrated safety systems.

The Agency's expectation was that the development of vehicles with these advances in safety would lead to the enhancement of safety in production vehicles. It was hoped that the example set by the RSVs would be adopted by the auto manufacturers world-wide.

We believe this program was successful in developing a vehicle which provided significant improvements in occupant crash protection using state-of-the-art technology. While we do not now and never really did anticipate that a totally integrated safety vehicle will necessarily be produced commercially, we have seen a number of RSV features that have been or are being adopted to production vehicles.

These features are:

Design applications and production methods for use of high strength lightweight steels in unibody type structures to reduce weight while maintaining crash-worthiness.

Various body structure design details such as side door and hood interlocks that improve crash performance of lightweight cars.

Automatic restraint systems, including movable belts and multi-celled airbags.

Windshield glazing that provides protection against facial lacerations.

High-mounted rear brake lights that reduce rear-end collisions.

Expanded use of plastics in bumpers and body panels that reduce low-speed collision damage.

The results of the RSV program, augmented by field data, have enabled us to take the next step we had always planned for this effort: to focus on specific components and sub-systems of vehicles that can be improved within the context of present or foreseeable manufacturing operations. I emphasize the phrase "next step" in this effort because of an unfortunate misconception that the RSV program was somehow terminated prior to its completion. This is not the case. The program was completed. Now we are working to improve vehicle safety on a component-by-component basis rather than continuing to design new cars from the ground up. This "next step" will enable us to see improvements in safety adopted much more quickly than has been the case with the RSV program.

LAMINATED WINDSHIELDS

The National Traffic and Motor Vehicle Safety Act of 1966 empowers the Secretary of Transportation to establish motor vehicle safety standards to accomplish the Act's purposes of reducing traffic accidents and deaths and injuries resulting from such accidents. Exercise of this authority is a continuing dynamic process. A recent example of the exercise of this authority concerns the possible installation of new, plastic-coated windshields and windows in motor vehicles designed to prevent most of the facial scarring and disfigurement that results from shattered glass.

The existing requirements of Safety Standard No. 205, "Glazing Materials," do not permit the use of glass-plastic glazing in certain locations mainly because of an abrasion resistance requirement. After conducting an extensive evaluation of this

glazing material, I am pleased to announce that last Monday (March 7) we issued a Notice of Proposed Rulemaking that would establish performance requirements specifically designed to ensure the safety and performance of such glazing material.

Such windshields are composed of laminated glass to which a layer of polyurethane is bonded on the inner side. The windshield reduces the risk of lacerations to car occupants who strike the window in an accident, because the plastic inner layer prevents the occupant from coming into contact with the sharp glass edges that are formed when the glazing is struck and broken.

In late February I approved the pilot use of the windshields in a field evaluation of 2,500 Chevrolet Cavalier and Pontiac 2000 sedans and station wagons. The main objective of this field test is to investigate the durability, scratch resistance and any tendency of the glazing to become hazy and thus reduce visibility. While plastic glazed windshields have been in use in Europe, driving in North America includes a much wider range of temperature, humidity, and dusty conditions, which makes a U.S. field test of the windshields necessary.

My testimony today has, I hope, illustrated by specific example what the Agency has done and continues to do to help make improved safety options available to the public. Neither we nor the industry have ever had, or will ever have, all the answers. As far as the Agency is concerned, however, our commitment of resources and ingenuity to the search for constant improvement continues to be among our highest priorities.

This concludes my prepared statement. I would be pleased to answer any questions you may have.

[The following information was subsequently received for the record:]

QUESTIONS OF THE MAJORITY AND THE ANSWERS THERETO

Question 1. You testified that the law governing bumpers stipulates that NHTSA must require the bumper which produces the "maximum feasible reduction in cost." Based on your analysis, you stated that the 5 mph standard, on average, was \$28 per vehicle more expensive than the 2.5 mph standard. Please provide more information as to the various figures which comprise your average cost calculation.

Answer. In estimating the net benefit of alternative bumper requirements, NHTSA considered a wide range of variables which would be influenced by bumper strength requirements. These include primary and secondary system costs and weights, fuel savings, interest savings, repair costs, insurance premiums, and the value of the delay and inconvenience associated with low-speed crashes.

For each of the above variables, ranges of possible values were used to test the sensitivity of the net benefits to consumers to our assumptions. NHTSA believes the most likely values of consumer benefits and costs of 2.5 mph bumpers, compared to 5 mph bumpers, are \$93 in vehicle price and fuel savings, offset by an increase of \$65 in higher repair costs. This results in a net benefit of \$28 per car or approximately \$300 million per year once all cars are so equipped. Specifically, the \$28 is comprised of:

Gross cost savings to consumers:

Initial car price savings.....	\$39
Primary bumper components.....	(26)
Secondary weight costs.....	(13)
Finance charges.....	4
Fuel cost savings.....	50
Total.....	93

Gross increase in repair costs to consumers:

Increase in repair costs (including unrepaired damage).....	47
Increase in insurance administration.....	12
Increase in delay/inconvenience.....	6

Total..... 65

Net savings equals \$93, minus \$65 equals \$28 per car.

Question 2. At the hearing, you mentioned NHTSA's ongoing seat belt use campaign. You also noted that at present, only 10-11 percent of people use their seat belts. Obviously, it would be beneficial to greatly increase the amount of seat belt use. Do you have any specific target level of belt usage for which you are aiming in

your seat belt campaign? What are the specific goals of the buckle-up campaign and how is the program designed to successfully achieve them?

Answer. At the hearing, we did not have the results of the most recent surveys which we do have now. Observations taken during the end of 1982 and the first part of 1983 indicate that the rate has increased to 13.6 percent for drivers. Passenger use rate data is still being collected and analyzed.

We have hesitated to predict exactly when a particular safety belt usage goal would be reached. Many changes in awareness, knowledge, and attitudes must take place first. The results of foreign experience would indicate that a usage rate in the 20 to 30 percent range is certainly feasible. It also seems that to the extent that any State engages itself extensively in this effort, such a rate would be achieved within approximately 3 years. If most of the States are actively engaged in the program, a national usage rate of 25 percent is achievable in that period of time. That is our goal.

The NHTSA program to increase safety belt and child safety seat usage is significantly different from past programs. It consists of several facets such as efforts to reach corporations, governments, and volunteer and service groups in addition to the mass media programs which have been sole components of most past efforts.

Many other groups are being solicited to aid the agency in this effort. Most behavioral and communications experts agree that this approach is the only approach likely to succeed. That, however, does not guarantee its success. The most important variable in determining the success of the program will be the extent to which the various organizational networks, States, and communities engage themselves in the effort. NHTSA's objective is to increase that involvement to the maximum extent possible.

Question 3. You testified before the Subcommittee that the issue surrounding airbags is not technology; rather it is acceptability and public acceptance. The various demonstration programs to be undertaken by NHTSA are a positive step. However, numerous witnesses have testified before this Committee and shown that the technology is beyond the point of requiring a demonstration project. If these projects are aimed at increasing public awareness and acceptance of airbags, how is this going to be done? Is NHTSA going to embark on an extensive advertising campaign highlighting the results of the program? What, specifically, are NHTSA's plans in this regard?

Answer. First, I want to emphasize that while I stated in my testimony that the problems with the driver's side technology have been basically solved, I also stated that not all of the technological issues have been resolved. For example, not all of the issues have been resolved with respect to very small subcompact cars. Also, the specific performance requirements of the standard continue to be very troublesome from a technological standpoint.

With respect to how we specifically are going to increase public awareness and acceptance of this technology, the primary thrust of our efforts at this time is to develop a guaranteed market for airbags. If successful, such a market will encourage manufacturers to provide airbags as a consumer option. More specific plans for increasing public awareness and acceptance will be formulated as our demonstration programs with the GSA and State police vehicles make progress and the data from these programs become available.

When the contracts have been let we will certainly consider ways to maximize the visibility of the program to the public at large, including use of the authority to carry out the \$16 million public information and education campaign to promote the cause of highway safety through the use of television and radio which was funded in the five-cent gas user fee legislation.

Question 4. The automobile industry has presented some advertising highlighting various safety features. Why doesn't the industry, however, more aggressively advertise on the basis of safety?

Answer. We have no way of knowing, with any degree of certainty, exactly what criteria the industry uses when it makes its marketing decisions from model year to model year. We do know, however, that one effect of requiring all manufacturers to meet the requirements of the Federal Motor Vehicle Safety Standards has been relatively little product differentiation among competing vehicles based on their safety features. Also, it is quite clear that the manufacturers are extremely concerned about their potential liability for advertising safety features which could be challenged for improper functioning.

It is worth noting, in this context, that in June, 1982, GM held a day-long briefing for the news media at its Milford, Michigan Proving Grounds during which GM Vice Chairman, Howard H. Kehrli disputed the view that "Safety Doesn't Sell". Mr. Kehrli said that he doubted that statement was ever true and noted that public opin-

ion surveys show a growing number of Americans are giving a higher priority to safety when they consider buying a car. On the other hand, he pointed out that while car buyers want cars and trucks which have inherent safety and reliability, they want "safety characteristics which are consistent with other desired characteristics in the vehicle".

GM also has strongly supported NHTSA's campaign to increase usage of seat belts. For example, among other actions, GM has:

- Adopted a corporate-wide policy of expected belt usage in company-owned and licensed vehicles.

- Supported that proposal in the Michigan Legislature for a three-year trial of a mandatory belt use law.

- Supported child restraint use laws.

- Expanded the corporation's employee education campaigns emphasizing seat belt and child restraint usage.

- Sent a letter to the GM Officers and Directors who sit on Boards of other corporations encouraging them to promote within those companies the adoption of ongoing programs to educate or remind their employees about the importance of using seat belts.

- Conducted a community education program on belt usage via the GM Field Speakers Bureau.

- Run customer information ads in newspapers and magazines.

- Started a widespread radio campaign emphasizing the value of using seat belts.

- Conducted a positive incentive belt-use campaign at the company's Technical Center in Warren, Michigan, in which motivational aspects of belt usage were studied. (Several fully equipped new cars were given away in a prize drawing to employees who had signed a pledge to wear their seat belts. Over ¾ of the Technical Center employees signed the pledge and returns from surveys taken at the Center's gates showed an increase in belt use from 38 percent to about 60 percent.)

Question 5. You noted in your testimony that NHTSA has replaced the Car Book with a hot line to provide consumers with information on cars. Is this a realistic approach? Isn't it difficult for a consumer to obtain information on all the various safety features of a number of cars over the phone? What written data on auto safety characteristics are available to consumers from NHTSA?

Answer. I did not mean to state or imply in my testimony that NHTSA has "replaced" the Car Book with our Hot Line. I simply noted, in reply to a statement made by Chairman Danforth, that the Car Book as such has been succeeded by other superior marketing devices. The Car Book was always understood to be a dated product and that there was never any thought given within the Agency at the time of publication to continue it. Indeed, budgeting for its initial publication was drawn from the Agency's rulemaking budget, and funding had to be found elsewhere in 1981 to avoid severe compromise of our rulemaking or crash-testing programs. There are still about 100,000 copies of the Car Book which are available free to the public from the Government Printing Office, Pueblo, Colorado 81009.

The Hot Line is intended, though, to provide every element of data that is in the Car Book in a much more updated, much more complete form which is continually being improved.

The Hot Line is a sound, realistic way to provide consumers with what they want to know about cars and car safety. In-house reproduction of safety-related information allows us to constantly update our information. Publications such as the Car Book have long lead-time printing requirements and become out-of-date almost at the time of their publication.

The Hot Line allows consumers in a single toll-free telephone call to obtain printed information on such items as: vehicle-specific data on auto recalls, fuel economy ratings, crash test results, bibliographies identifying magazine articles on specific makes and models, vehicle maintenance figures, costs of operating vehicles, various publications available from NHTSA, reprints of articles and current information from our technical library, print-outs of entries from the Office of Defects Investigation showing consumer complaint letters, manufacturers' service bulletins and recalls, records of defects investigations and engineering analyses, information on the odometer law, safety seats for children, alcohol safety and driving information.

QUESTIONS OF THE MINORITY AND THE ANSWERS THERETO

Question. Has NHTSA initiated any rulemaking proceedings during your tenure?

Answer. Yes, NHTSA has initiated many rulemaking proceedings during my tenure. In order to keep our standards and regulations up-to-date, a continuing dynamic process is required.

Some actions, of course, are not very significant in themselves. In the aggregate, however, they provide cost benefits while ensuring continued safe performance. Thus, even relatively insignificant rulemaking proceedings are a vital part of our mandate to regulate an industry that is constantly changing in terms of product design and technology. In this area, the Agency has proposed and/or adopted a variety of amendments during my tenure dealing with such things as the symbols used to identify controls and displays, the light intensity requirements for vehicle displays, the labelling of brake hoses, various technical requirements for vehicle lighting systems, requirements for power-operated windows, school bus requirements, and fuel economy reporting requirements.

NHTSA has initiated two rulemaking actions to amend FMVSS No. 108, Lamps, Reflective Devices and Associated Equipment. In October 1982, in response to a petition for rulemaking, NHTSA proposed an amendment that would allow motor vehicles to be equipped with a new two-lamp rectangular sealed beam headlamp system smaller than that currently allowed. The new system is designed to have the same photometric performance as the larger lamp currently used and, as a result of front end sheet metal modifications made possible by the system, could result in a significant improvement in vehicle aerodynamics and thus in fuel economy. A final rule is expected this spring.

In January 1983, in response to a petition for rulemaking, NHTSA proposed several amendments to reduce or eliminate design restrictions that could be serving to impede implementation of enhanced lighting technologies that could improve the safety and fuel economy performance of automobile. A final rule is expected later this year.

In March 1983, in response to a petition for rulemaking, NHTSA proposed an amendment to FMVSS No. 205, *Glazing Materials*, to permit the installation of glass-plastic glazing as windshields and windows in motor vehicles and to adopt appropriate performance requirements for such glazing. Such glazing could substantially reduce lacerative injuries when vehicle occupants strike glazing in an accident. The comment period closes April 25, 1983. A final rule is expected in the fall of this year.

In December 1982, NHTSA proposed to add new requirements to the Consumer Information Regulations to ensure that drivers are aware of the handling differences between utility vehicles and passenger cars. The proposed regulation would require manufacturers to place a prescribed sticker on the windshield or dashboard to alert operators, as well as to provide information in the vehicle owner's manual.

The Agency is continuing to consider actions on a number of Notices of Proposed Rulemakings issued before my tenure, including one which would establish a requirement for high-mounted brake lights and one which would require lap belt and tether anchorages for use with child restraint systems. I expect to be able to make decisions on these two actions this spring.

With respect to entirely new rulemaking initiatives, we are moving aggressively. During my tenure, the Agency has examined, for the first time, every one of our rules and regulations and every element of research to identify areas where we can undertake new initiatives. But research takes time. Every subject that has been ripe for rulemaking has already been covered. It is simply an accident of history that every subject we have identified or that was identified by the prior administration and that we are continuing to examine has not yet reached the stage of final promulgation.

Question 2. Can you prove that seat belt usage has increased as a direct result of your educational campaign?

Answer. Yes. NHTSA measures national belt use through an observation study performed in 19 cities selected to represent the United States. The observed belt use for drivers during 1981 and through the summer of 1982 was 11.5 percent. Observations taken during the end of 1982 and the first part of 1983 indicate that the rate has increased to 13.6 percent. This is a significant increase and suggests very strongly that safety belt use is increasing.

While the cause-effect relationship would be difficult to prove, we are having the data reviewed to get a better analytical perspective on what are the influencing factors. The experience of other countries, however, as well as that of our Department of Transportation, indicates without question that significant increases can be achieved through a campaign that includes public information and education components. Sustaining the increases has been one of the major difficulties and is one which our comprehensive program should substantially overcome.

There are success stories throughout the country, however, some of which began prior to the Administration's emphasis on a national safety belt promotional campaign. We are making the tentative assumption, at this point, that the apparent increase in the national usage rate is due, in great part, to campaign activities in numerous places throughout the country.

Specific cases of programs that have been successful are as follows:

(1) At the General Motors Technical Center in Warren, Michigan, a combined education and incentives program initiated in May of 1982 achieved a daily average employee usage rate increase from 36 percent to 70 percent, which is being sustained at about 60 percent without incentives. General Motors is implementing similar programs at two other sites.

(2) A 1981-1982 North Carolina project was based on the well established learning principle that smaller, more frequent rewards can more successfully modify behavior than less frequent albeit greater rewards (greater protection in the event of a crash). The approach was tested at two sites in Chapel Hill, North Carolina—The Chapel Hill Senior High School (October 1981-June 1982) and the State headquarters for Blue Cross and Blue Shield (November 1981-August 1982). At both locations, baseline shoulder belt observations were made over a period of several months, followed by a period of announced belt use monitoring, an educational phase of 3-4 weeks, a month long incentive phase, and follow-up observations in the absence of any promotional activities. During the incentive phase, a sample of cars was randomly stopped each day while entering/exiting parking areas, and coupons redeemable for \$5 were awarded to all belted occupants in the vehicle.

As a result of these efforts, shoulder belt usage rates at the high school rose from a baseline average of 20 percent to 34 percent during the educational phase, 53 percent during the incentive phase, and dropping back to 36 percent during follow-up. The belt use percentages for Blue Cross and Blue Shield were 8 percent baseline, 28 percent education, 56 percent incentive, and 25 percent follow-up. When an estimate of overall restraint use (lap/shoulder belt plus lap belt only) was calculated, incentive phase values for both locations peaked at around 70 percent. The fact that observed belt usage did not return to baseline levels is evidence for some lasting safety belt wearing increases among the two populations studies.

(3) A combined information, education and incentive safety belt program was initiated at DuPont Corporation's Waynesboro, Virginia, plant in February 1982. At that time the usage rate was 25 percent. By August, the rate had increased to an average of 93.4 percent.

After a letter went to all employees in March explaining the program, the initial phase began with the use of signs, bumper stickers, costumed employees as well as obvious management participation. Signs were displayed to show progress. By the end of April, the rate had reached 54 percent from the base of 25 percent. Additional promotional features during the next few months included high school cheerleaders, band performances, safety belt articles, strawberry pies on "Pie Day", and personal contacts. During the six months of the program, seven employees qualified for the Kangaroo Club—no injuries or only minor injuries because safety belts were worn when accidents occurred.

Question 3. What has NHTSA done in the area of truck safety?

Answer. The area of truck safety has been a matter of significant concern to the Agency during my tenure. Our principal priority concerning heavy trucks involves vehicle improvements to enhance their "crash-avoidance" ability. Our current activities in this area involve: improved rear and side lighting or other visibility features to reduce nighttime truck accidents; consideration of a truck underide regulation; improved defrosters/defoggers to increase visibility; efforts to improve truck braking capabilities by determining minimum performance levels for hydraulically equipped brakes, air-braked tractor/trailer combinations, automatic brake adjusters to maintain stopping distances, and brake retarders for use on steep grades. We are also investigating the performance and handling characteristics of large trucks. These programs will examine the nature of these safety problems, and determine solutions which will improve truck safety.

A discussion of the state-of-knowledge on the impact of heavier and larger trucks on the road was presented in NHTSA's Report to the Congress on Large-Truck Accident Causation, which was submitted on September 13, 1982¹ (copy attached). This report concludes that accidents involving large trucks (more than 10,000 pounds gross vehicle weight) are a serious safety problem on our Nation's highways. In 1979-1980, large trucks were involved in an annual average of 5.7 percent (385,000)

¹ A copy of this study has been retained in the committee files.

of all police-reported accidents. Yet, they accounted for 11.8 percent (5,360) of all fatal accidents, in which 5,874 persons died.

The report identifies the driver, vehicle and highway/environmental factors which contribute to the frequency and severity of accidents involving large trucks. Recommendations are made for improving large truck safety in the following areas: braking system performance, safety belt usage and design, driver qualification and licensing, high-hazard locations, truck maintenance and inspection programs, and research and development needs.

The Surface Transportation Assistance Act of 1982 directs the Secretary to report on the potential benefits and costs anticipated from the establishment of an intercity network of truck routes for the larger trucks. Among other things, the Act calls for an analysis of the safety record of larger trucks and of the effect of the new size and weight limitations. NHTSA is cooperating with FHWA in preparing this report, which is to be completed in July 1984. In addition, the Act directs the Secretary to have the National Academy of Sciences monitor the effects of the use of trucks with two trailing units on the Interstate System with respect to highway safety and prepare a report which we expect to complete in early 1985.

In the area of truck occupant safety, we have activities to examine excessive cab structural deformation (primarily resulting from vehicle rollover), to examine why and how truck occupants are ejected from the vehicle (ejection occurs in over one-third of all truck occupant deaths), and to investigate the forces involved in driver impact with the steering column to determine appropriate measures to reduced the harm incurred by truck occupants.

We have also initiated efforts to inventory safety belt use by truck occupants and are working with the trucking industry (the American Trucking Association) to increase belt use. We have also been in contact with the Occupational Safety and Health Administration to discuss ways of attaining higher belt usage in both Federal and private fleets. The Bureau of Motor Carriers Safety issued a regulation in 1970 requiring the use of safety belts for drivers of vehicles under their jurisdiction (49 CFR 392.16).

In addition to our active research program in truck safety, NHTSA is actively considering a rule that would require devices which prevent splash and spray from heavy trucks. A final rule on this matter, which was mandated by the Surface Transportation Assistance Act of 1982, should be issued before the end of 1983.

Question 4. If airbags were used instead of detachable passive belts, would the passive restraint standard be cost-effective?

Answer. NHTSA's policy has been, and still is, that the conversion of safety benefits (i.e., lives saved and injuries avoided) into dollar figures is an improper and inappropriate method of reaching decisions on safety issues. The agency's governing statute dictates that while costs and benefits must both be considered, safety is of overriding concern. Thus, regardless of a dollar-based benefit cost analysis, it cannot be used as the sole criterion for decisionmaking.

NHTSA estimates that the price range of full front seat airbags is \$300 to \$355 per car (1982 dollars), based on annual volumes of greater than 1 million cars. The consumer cost of one model year (assumed to comprise 10 million passenger cars) would be \$3.00 to \$3.55 billion.

The incremental benefits when all cars in the fleet are equipped with airbags is estimated to be a reduction of 8,500 fatalities and 135,000 moderate to critical injuries. These estimates are incremental savings over and above 1982 seat belt usage effectiveness. They are based on preliminary estimates of 1982 passenger car front seat occupant fatalities (21,330) and moderate to critical injuries (344,000). They assume 1982 seat belt usage (approximately 10 percent for all front seat occupants) will continue when airbags are installed. With this seat belt usage level, airbags are estimated to be 43 percent effective. Of course, it will take 10 years until all cars are equipped with airbags.

Recently, NHTSA published a report entitled "The Economic Cost to Society of Motor Vehicle Accidents." Based on the estimates in this report, the annual reduction in fatalities and injuries resulting from airbags use would reduce the economic cost to society by \$4.2 billion (present value of 1982 dollars).

Question 5. Why did NHTSA discontinue publication of the Car Book?

Answer. NHTSA did not "discontinue" publication of the Car Book. It was never intended to be other than a one-time only program, as is evident from the budget submissions and priorities of the Agency and the fact that no model year information is displayed. Moreover, it was always understood to be an inefficient product from a currency standpoint, with much of its information rapidly becoming dated over time. There was never any thought given within the Agency at the time of publication to continue it on an ongoing or regular basis.

We do not believe that the publication of a single major printed document such as the Car Book is the best way to serve the needs of new car buyers and automobile consumers. The nature of a publication such as the Car Book does not lend itself to updating or correction of data and information. This can be most readily shown by mentioning that of the 91 1979-80-81 vehicle crash test results displayed as applicable to 1982 cars in the privately published 1981 version of the Car Book, 21 of the cars in question have in the Agency's judgment been so dramatically changed that the earlier test results can not validly be applied to new cars at this time.

Moreover, the great bulk of information, guidance, tips, etc., contained in the Car Book does not change over time. Continued re-publication by anyone of that data is unnecessary and wasteful from the taxpayers' or consumers' standpoint. There are presently about 100,000 copies of the Car Book which are still available free to the public from The Government Printing Office, Pueblo, CO 81009.

Question 6. Why did NHTSA take so long to address the "Securiflex" Technology?

Answer. During the decade preceding the current rulemaking, the agency was aware and interested in the newly emerging technology dealing with anti-lacerative windshields. For example, in the late 1970 period we began experimental investigations toward futuristic ways to improve automotive safety, and actually used Securiflex windshields in our Research Safety Vehicle (RSV). This RSV embodied many advanced engineering concepts toward a common objective: safety improvements regardless of then existing regulatory restrictions.

At approximately the same time, these windshields were being introduced on the European market for use in Peugeot and Audi automobiles. Under European safety regulations, plastic coated windshields were permitted. (Their use in the United States is not currently permitted until the existing abrasion resistance tests are modified to accommodate the softer plastic coatings).

During 1980, the Agency was petitioned by the manufacturer, Saint-Gobain Vi-trage, to permit the use of this new technology currently in use on about 30,000 European cars.

The agency then responded to a petition submitted on June 12, 1980 by the European manufacturer of the "Securiflex" windshield. Although many technical questions remained to be answered satisfactorily, the agency granted the petition on December 15, 1980 (45 FR 82292). Shortly thereafter, public response and comments concerning each of the technical issues (such as ultraviolet stability, abrasion resistance, delamination durability, haze development, weathering capability and optical clarity) were solicited in an Advance Notice of Proposed Rulemaking which was published on January 20, 1981 (46 FR 8067). The responses to this advance notice were technically meager, and it became necessary to conduct additional investigations to augment our understanding of the issues involved and to provide data based on test results. Accordingly, the agency requested that physical specimens of some typical European "Securiflex" windshields be provided for additional tests to verify the petitioner's allegations. These specimens were acquired and provided during the spring and summer of 1981, and on October 30, 1981, a test program was started at the National Bureau of Standards to measure certain optical properties of the submitted Securiflex specimens. This test program dealt mainly with two principal optical properties of the glazing: luminous transmittance and haze. In all respects, the test program corroborated the manufacturer's claims, and the Bureau of Standards issued their final report on January 17, 1982.

However, other questions, such as ability to endure cleaning, both mechanical rubbing and resistance to chemical solvents, remained answered to a degree less than completely satisfactory.

In order to fill this information gap, a special study was initiated at the Illinois Institute of Technology Research Institute (IITRI) on March 4, 1982. The objective of this work was to extend our understanding of the benefits and pitfalls of the new "Securiflex" technology. The final report is due in the near future, and preliminary test findings verify the petitioner's claims.

Prior to 1981, this issue was not an agency priority. Subsequent to the agency's granting of the petition on December 15, 1980, all of the above work was initiated as expeditiously as possible consistent with existing contractual obligations, and provided a smooth, continuous effort to resolve the many issues involved in this case. One March 10, 1983, a Notice of Proposed Rulemaking 48 FR 10097 was issued to amend the Safety Standard (No. 205) to permit the use of this new material.

Question 7. Is the legislative history on the Motor Vehicle Costs Savings Act relevant to the 5 mph versus 2.5 mph bumpers decision?

Answer. Yes, the legislative history of the Act is relevant to the Agency's decision on the bumper standard. For example, it is clear from the legislative history that the Congress did not intend to mandate a specific speed requirement for bumpers.

As enacted, the statute gave the Secretary the full discretion to determine what speed requirement in a bumper standard would yield the maximum feasible savings to the consumer. The legislative history shows that Congress recognized the complexity of the determination that would be involved in setting a property loss reduction standard at a level that would maximize savings to consumers and, accordingly, decided that it was best to delegate the discretion to make that determination to an administrative agency with the requisite expertise.

In 1980, the Senate passed, the conferees adopted but the House did not enact, legislation which would have lowered the impact speed to 2.5 mph, which the Agency has now done under its discretion.

Question 8. How much money is budgeted for FY 84 for the seat belt campaign? Please outline how that money will be spent.

Answer. NHTSA will spend the following amounts on the FY'84 seat belt campaign:

	<i>Amount</i>
Section 402 State Highway Safety Funds.....	\$4,000,000
Section 403 Operations.....	1,440,000
Section 403 Research.....	1,195,000
Section 209 Highway Safety Information.....	500,000

These funds will be spent in the following ways:

Section 402.—Pursuant to § 1107(a)(3) of the Omnibus Budget Reconciliation Act of 1981 (P.L. 97-35) and § 203(a)(3) of the Surface Transportation Assistance Act of 1982 (P.L. 97-424), each State must use, for the fiscal years covered, not less than 2 percent of its section 402 highway safety funds for safety belt promotion. Listed below is an array of projects that may be carried out by the States to fulfill this obligation:

Distribute educational material and design educational activities for target audiences,

Establish public information and mass media campaigns,

Establish child safety seat programs,

Carry out demonstrations and other public displays,

Take usage surveys,

Provide safety belt program management and support.

Section 403—Operations.—NHTSA seat belt activities under Section 403 operations are:

Public education: Campaign planning; materials development; materials reproduction and distribution; and support for State/local programs.

Network promotion among: Educators; public health and other medical officials; and civic, military and safety officials.

Evaluation of single projects and projects at the State and community level.

Sec. 403—Research.—NHTSA safety belt activities under Section 403 Research are:

Compiling usage rates and finding trends.

Collecting special site usage data.

Assessing influence of motivational factors.

Evaluating effectiveness of special materials and strategies.

Assessing effectiveness of existing programs.

Sec. 209.—NHTSA safety belt activities under this section of the 1978 Surface Transportation Act as recently amended are:

Pilot projects and demonstrations.

Mass media campaigns.

Education.

Use incentives.

Evaluation.

Question 9. Do you agree with the recommendations of the Presidential Commission on Drunk Driving?

Answer. Yes, overall we agree with the interim recommendations of the Presidential Commission on Drunk Driving.

To place these interim recommendations into some perspective, they might be compared with the requirements of the Section 408 alcohol incentive grant legislation enacted last year (P.L. 97-364). These differences are primarily in the area of judicial penalties for first offenders, i.e., drivers convicted for the first time of driving drunk.

The Commission recommended either (1) a mandatory jail or (2) license suspension and 100 hours (versus 10 in Section 408) of community service for first offenders. Section 408 requires as a basic criteria a 90-day license suspension for all first

offenders, without alternatives. As implemented by NHTSA, Section 408 permits the use of a restricted or conditional license in exceptional circumstances, after a "hard" 30-day suspension that would apply in all cases concerned by the requirement. The Commission recommends a mandatory 10-day jail and one-year license revocation for second offenders, and 120 days jail and 3-year revocation for third and subsequent offenders. Section 408 requires a mandatory one-year license suspension with no provision for restricted or provisional license.

There are a number of other recommendations made by the Commission which are not specifically addressed by the Section 408 legislative criteria. The following is a synopsis of these recommendations by program headings and a discussion of how the agency is addressing them:

(I) SYSTEM SUPPORT

In this area the Commission made a series of recommendations pertaining to training of police, prosecutors, judges, periodic reviews of State legal systems, improvements in roadway markings and signing, and the establishment of a national body to continue the work of the Presidential Commission. The development of training materials and the conduct of training for practitioners in the Driving While Intoxicated (DWI) system is an ongoing responsibility of this agency. Since the Federal Alcohol Safety Action Projects (ASAP) program of the 1970's, we have recognized the need for a periodic review of State DWI legal systems, and have consistently recommended that this be done. Improved roadway markings and signing continues to be a priority item for the Federal Highway Administration. Whether there is a need for an additional private organization to carry on some part of this activity remains an open question. In any event, however, the role of this agency as a national clearinghouse for successful program ideas and countermeasure technology should not be diminished.

(II) ENFORCEMENT

In the area of DWI enforcement, the Commission made a number of recommendations pertaining to implied consent statutes, mandatory blood alcohol testing for drivers involved in fatal and serious injury crashes, as well as procedures involved in the DWI arrest process. One of NHTSA's original Highway Safety Program Standards (No. 8) required States to take blood alcohol tests of all fatal crash-involved drivers. It did not, however, mandate BAC testing for serious injury crashes. While this idea certainly has a lot of merit, our present difficulty in getting BAC's for fatal crashes makes it unlikely that we could easily obtain this data.

Regarding arrest procedures, we have long recommended streamlining the booking and arrest procedures associated with DWI, and we have training curricula and recommendations already in place to accomplish these ends. There are, however, matters contained in the Commission's recommendations on implied consent which should be reviewed. These include the introduction of BAC test refusal into drunk driving prosecution; the issue of a drunk drivers' right to consult his attorney prior to a chemical test; the admissibility of Preliminary Breath Test (PBT) results in DWI trial proceedings, and finally the recognition of implied consent refusal as grounds for licensing action in States other than the one in which the driver was arrested.

(III) PROSECUTION

In this area the Commission recommended defining drunk driving in breath alcohol as well as blood alcohol terms, and the establishment of an ongoing process within the States by which prosecutors should keep enforcement agencies informed of legal developments and changes in DWI laws. We concur with both these recommendations and have made similar recommendations in the past to the States.

(IV) ADJUDICATION

In this area the Commission recommended against pre-conviction diversion of DWI offenders to education/treatment programs, and came out in favor of the establishment of DWI felony laws for drunk driving cases in which death or injury occurs. It also recommended the decriminalization of lesser traffic offenses to infractions in order to speed adjudication and free more time for drunk driving cases. We concur with these recommendations and have made similar suggestions to the States.

(V) LICENSING ADMINISTRATION

The Commission made two recommendations in this area which are not addressed by the Section 408 program. The first recommendation is for a provisional license for young novice drivers which would be withdrawn on a DWI conviction or an implied consent refusal. NHTSA has not developed a data based position on such provisional licensing. However, we do have a demonstration project in Maryland that should enable us to make appropriate recommendations by December 1983. The remaining recommendations pertain to inclusion of more alcohol and drug information in the licensing process which we have long advocated.

(VI) ALCOHOL BEVERAGE REGULATIONS

The one recommendation not addressed in the Section 408 process pertains to so-called "open container laws." We concur with the recommendation that state and local governments should prohibit consumption of alcohol beverages in motor vehicles.

(VII) PUBLIC AWARENESS/PUBLICATION EDUCATION

In this area the Commission made a number of recommendations for public information and education (PI&E) programs. One of these recommends the identification of a single coordination agency for PI&E programs. We concur in this recommendation and believe that the lack of sophisticated PI&E programs is a weakness of many State drunk driving programs. We are now providing technical assistance by communications specialists to the States, and we believe this program should be continued and augmented. The other recommendation pertains to the need for youth drunk driving programs. We now have underway the development of our Youth Alcohol and Safety Belt Program and we believe that this program will adequately address this area.

(VIII) PRIVATE SECTOR

In this area the Commission made a number of important recommendations not dealt with in the Section 408 process. These pertain to the important role of the private sector in State and local drunk driving programs, and focus, in particular, on the motor vehicle, insurance and alcohol beverage industries. What is needed is an industry-specific strategy accompanied by supporting materials and specific program recommendations that can be advanced to key industries for use in the States. For example, a strategy for the auto industry might include greater involvement by local dealers and dealer trade associations in State and local programs such as the creation of local Dealers Against Drunk Drivers Chapters (DADD). Manuals describing what the DADD program should include, specific projects to be undertaken, sample posters and handout materials could be provided as well as indications as to where further materials could be obtained for distribution. Once an industry-specific strategy program and materials package is at hand, an implementation strategy involving members of the Presidential Commission, as well as agency personnel, and direct promotional activities with key industry leaders and trade associations could then be developed.

(IX) EDUCATION AND TREATMENT

The Commission recommendations in this area are entirely consonant with agency recommendations which we have advanced since the ASAP Program. Moreover, with the completion of the Comprehensive DWI Offender Treatment Program in California, we are now in a position to make more specific recommendations to the States for alcohol education programs and we are undertaking a program to do so. One area where we might consider additional efforts is in the area of juvenile offender treatment programs.

Question 10. At the hearings on March 10, 1983, Mr. Friedman of MCR Technology testified that it would increase the cost of an auto by 30 percent if all the RSV technology were implemented and that fatalities and injuries would be reduced by 75 percent. You have indicated a \$53 billion societal loss caused by auto accidents. Do you believe implementation of RSV technology would be cost-effective?

Answer. Estimates of both the cost and the effectiveness of RSV designs are variable and speculative. The 75 percent reduction in fatalities and injuries referred to by Mr. Friedman was actually the goal of the RSV development program. Although the limited tests which were conducted appeared encouraging, the actual effectiveness of these designs remains uncertain.

NHTSA recently completed a study which measured the economic costs that result from motor vehicle accidents. This study indicates that of the total cost to society of motor vehicle accidents, only about \$16 billion results from injuries to occupants of passenger cars. If RSV's were able to meet the goal of 75 percent reduction in fatalities and injuries, this could indicate possible economic savings of roughly \$12 billion once the entire passenger car fleet incorporates the RSV features. The 30 percent cost increase indicated in Mr. Friedman's testimony, if able to be held to that level in actual production, would result in higher annual vehicle costs of roughly \$28-30 billion. The economic savings from occupant fatalities and injuries prevented would therefore not offset higher vehicle prices, and would not be cost-effective.

In addition to preventing injuries to vehicle occupants, RSV features would also affect property damage costs. In low-speed accidents, repair costs would be reduced; however, in higher speed crashes, vehicle repairs would become more expensive. NHTSA currently does not have any reliable estimates of the net effect of RSV technology on the cost of property damage.

Finally, the underlying question of the practicability of the more advanced technology represented by the RSV will depend on whether it can be implemented consistent with the experience of modern manufacturing processes, including the health and safety of the manufacturing personnel, and with the more compelling expectations of comfort and convenience.

All of these remain to be established when and if major efforts to underwrite new production facilities and programs come to fruition.

Senator DANFORTH. Next we will have Mr. Howard Kehrl of General Motors. Mr. Kehrl, thank you. Please proceed.

STATEMENT OF HOWARD KEHRL, VICE CHAIRMAN, GENERAL MOTORS CORP.

Mr. KEHRL. Good morning. My name is Howard Kehrl and I am vice chairman of the General Motors Corp.

We were honored, Mr. Chairman, to have had you visit us in Detroit earlier this year to tour our technical center and proving ground. And I might mention that Senator Riegle has honored us in a similar way in the past. I would like to extend an invitation to members of your committee to take a similar tour of our facilities and, most of all, examine for themselves the work that goes on there.

At these facilities and others, General Motors conducts the most advanced safety-related research in the industry. More importantly, we can say that the United States has the best highway safety record in the world, and it is improving. Of course, this record represents the effects of good roads, good drivers, and good law enforcement, as well as safe cars. But if this record were not as outstanding as it is, I do not believe we would take the same kind of pride in the research we are doing at General Motors.

Often, the safety improvements that result from our research are signaled by the introduction of new components in our vehicles. Some examples are the energy-absorbing steering column, high penetration resistance windshields, and child restraint systems.

While single technologies like these sometimes have a very high payoff, focusing all of our safety effort in one area or on a specific approach could very well diminish our effort in other areas that might offer much greater value to our customers. Instead we focus on the reduction of total harm to the car occupants.

This approach often leads to improvements that involve very subtle transformations: a change in the design of door latch hardware, or the use of a more energy-absorbing material in the vehicle's interior. These kinds of improvements are not expensive

addons. They are designed into the vehicle from the beginning. Reducing harm to vehicle occupants by design is the real challenge, and it has a very high payoff.

The starting point for GM's safety-related design is field accident data. I would like to note that the expansion of Federal support in recent years for field accident data programs has been beneficial to all parties.

Later in the design process, we use computer modeling and extensive product testing to improve our vehicle designs. Once we know how forces generated in a crash are distributed throughout a particular vehicle, we can make the changes needed to increase its level of occupant protection.

Perhaps one indication that our designs are paying off is the good rating GM cars have achieved based on insurance injury claims. In 1982, 15 of the top 17 cars identified by the Insurance Institute for Highway Safety were GM models—a record of which we are indeed proud. Of course, this record is influenced also by the size of our cars and by whom and where they are driven.

One of the ways the Government helps to assure that the safety improvements we develop reach consumers is by regulation. We support the administration's continuing efforts to improve existing regulations, and we are encouraged by its interest in coordinating Government research with research being performed in our industry. This kind of coordination can help maximize the effectiveness of the engineering community's resources, which are not unlimited.

Among the most significant demands on these resources is the need for better biomechanics technology for assessing neck injuries, injuries from side impacts, and all injuries in the severe to fatal range.

Although most Federal safety standards provide real benefit to consumers, some become obsolete as new technology is developed. One example may be the requirement for scratch-resistance of windshields, which has disqualified from use in this country the antilacerative windshields used in some vehicles in Europe. These windshields include a layer of special plastic on the interior side of the windshield that reduces significantly the chances of even small facial cuts being inflicted by windshields broken in an accident.

With Government approval—and NHTSA deserves credit for moving rapidly on this—GM is testing a fleet of 2,500 production built vehicles equipped with antilacerative windshields to determine whether they are suitable for use in this country.

I have here today sections of windshields removed from crash-test vehicles and the facecloths worn by the vehicles' dummy occupants. If you stop by the display and run your hand gently over the interior surface of the broken windshields, you will see the difference between the rough edges of broken glass on the inside of the standard windshield and the smooth surface of the antilacerative windshield. You can see the effects of this difference by comparing the torn surface of the face cloth that contacted the standard windshield versus the one that contacted the experimental windshield.

Important questions will have to be resolved before these windshields can be installed in most cars in this country. These questions will involve regulatory change and manufacturing capabili-

ties, as well as the way windshields perform in extremes of temperature and climate.

While Government regulation is an effective way of making proven safety features standard, such standardization is not always appropriate. In some cases, industry and Government can cooperate to identify specific applications in which a safety feature can be effective.

An example is GM's research on predriving tests to detect drunk drivers. In the early 1970's, GM adapted for automotive use a device developed by the National Aeronautics and Space Administration called the Critical Tracking Task. Now, NHTSA is nearing completion of a field test of the Critical Tracking Task in Los Angeles.

The initial results suggest the device can be used to prevent multiple drunk driving offenders from operating a vehicle while impaired. Whether the Critical Tracking Task becomes a significant element of the effort to deter impaired drivers will depend on evidence of its potential for public acceptance. Tests like the one in California can provide this information.

While I am on the subject, I would like to commend the chairman of this committee for the position of leadership he has taken with respect to legislation that addresses the problem of drunk driving, particularly legislation passed in the last Congress to provide Federal incentive grants for drunk driving programs.

As the careless driver reminds us all too often, it is not always enough to build safe cars. We must also develop safer driving habits. One way of doing this is to encourage individuals to use the safety equipment already available in their cars.

In positive incentive programs being conducted now at selected GM sites, employees who agree to wear their seatbelts become eligible to win prizes in company-sponsored contests, provided certain overall usage goals are met. At sites where programs are in effect, we have achieved very high usage rates, in some cases higher than 70 percent. At our technical center, where prizes were discontinued last October, usage remains at almost 60 percent. I do not have to tell you that this is well above normal levels and very good news for GM and its employees.

We are glad to see insurance companies beginning to use a similar principle of positive incentives in plans offering increased benefits to policyholders who wear seatbelts.

These premium discounts and prizes have an important, if unexpected, role to play in increasing highway safety. But there is no question that education is the most reliable way to insure a continued demand for safer cars and continued attention to safe driving.

We are supporting NHTSA's efforts to educate Americans to the importance of wearing seatbelts with a national campaign of print and radio advertisements. Also, our corporate advertising provides information to our customers about GM's safety research activities, the performance records of our products in field accidents, the importance of child restraint use, and the danger of drunk driving. Last summer, we conducted an all-day briefing at our Milford Proving Ground to familiarize the media with automotive safety issues.

The combined effect of all these activities by the Government, the automobile manufacturers, and the insurance companies ap-

pears to be an increase in the public's awareness of safety issues. Car buyers today are placing an ever-increasing value on safety in choosing a car. This is extremely important, because ultimately this interest and this demand give safety its place in the showroom.

Thank you.

Senator DANFORTH. Mr. Kehrl, thank you very much, and I want to thank General Motors for its hospitality to me and to the staff who went with me to Detroit in January for a very interesting day.

I might say that it was heartening, because I think anyone who thinks that the U.S. auto industry is just going to seed would be very much impressed by the effort that you are putting into technical development and to research and the design of cars and so forth.

That is not to say that the Government therefore has no role to play. Obviously, we do, and we are in the business of safety and will continue to be. But I think one of the main issues before us is how will we discharge that responsibility and how we are most effective in playing our role in saving people's lives and their limbs.

In the early 1970's, when General Motors was installing airbags in cars and it believed at the time very strongly about airbags and the chairman spoke very strongly about airbags, you conducted a sales campaign, I believe, to try to convince people to buy cars with airbags. And they did not want to buy them. They did not sell.

Therefore, the program was discontinued. I think that is a fair statement. You even provided some discounts or rebates, economic incentives to encourage people to buy cars with airbags. That to me would indicate that there is a limitation to what can be done on advertising. To advertise something as being safe might convince some people to buy it, but that is not necessarily going to be the case.

It is also true that General Motors has been something of an exception, in that you have had some advertising on the question of safety, but by and large the auto industry has been reluctant to emphasize safety. So my concern is that not only do I think it is probably not terribly efficacious to advertise it, but it is probably not going to be done to a very great extent.

I would like you to maybe give us your thoughts as to the relative roles of Government in mandating safety requirements on the one hand, on the basis that it is not going to be just voluntarily taken up with even an aggressive advertising campaign, and your view that public acceptance is important and that education is important.

Mr. KEHRL. Well, I think General Motors is acutely concerned about what appears to be a future that involves probably more auto fatalities per year than we have had in the past, partly as a result of smaller cars, partly as a result of increasing use patterns.

But, I think we do have a major interest in wanting to make the cars more safe. The advertising, as you suggest, is a problem. Part of it goes back to the fact that the whole safety question has not yet been reduced to a science. So much of it is not clearly known. Whether or not your car is clearly better in this respect than somebody else's and you can prove it in a court of law becomes a very difficult question.

This is the reason I think you see the manufacturers being very careful about advertising safety, even though their natural instincts would be to advertise it every way they could.

As far as the main thrust of your question, certainly the Government has a major role in regulation. All the manufacturers have to be on a uniform basis. Almost every part of the car now is impacted in some way by some safety regulation.

Most of those regulations are useful. We would like to see them improved. If there are new ones that are needed that come out of our mutual search for knowledge, then we would certainly support those. So we recognize very much the importance of the role of the Government in the regulatory process.

Senator DANFORTH. Senator Riegle?

Senator RIEGLE. Thank you, Mr. Chairman.

First let me congratulate you on the statistic that you cited, where apparently 15 of the 17 cars, your cars, scored well in the insurance measurement that you described, although as you pointed out there are a variety of factors, the size of the car and so forth, that influence that.

I am very much interested in what you have brought to us here. In a minute I would like to go down and just—if the Chairman would oblige.

But may I ask, this idea, where did this idea come from?

Mr. KEHRL. This particular windshield design is a development out of Europe, by St. Gobain-Vitragé. It is a plastic that is applied to the inside of a conventional laminated windshield. You know, there is a plastic now in the center, a thick piece of plastic—

Senator RIEGLE. I would like to come and take a closer look.

Mr. KEHRL. In running your fingers over the inside surface of the windshield, the difference is very obvious. The glass is currently on the inside and outside because of its outstanding wear characteristics. Here is a case where someone has developed a very promising approach. If you just run your fingers over the glass in the two cases, you can get an understanding of the difference.

Look at the difference in the chamois face mask. This development offers injury reduction, more than fatality reduction probably. The center laminate is the primary issue in fatalities, because that is what restrains the occupant. But the minor facial type cutting comes from the glass on the inner layer.

Senator RIEGLE. It looks to me like you almost know enough now to know that we ought to do this. How much longer will it take before the wheels will turn sufficiently so that in fact these are not in 2,500 demonstration cars, but in every car?

Mr. KEHRL. I agree, we should be trying to move on this as a technology. That is why General Motors initiated this program. We do have some concerns—they seem like trivial things but they could turn out to be important. If this glass hazes, if it scratches so that the person cannot see well, if some of the stickers we stick on it destroy the inner surface. These are things that can be corrected, but you would like to know what you are going into.

Now, I think another temptation we should avoid here is that I am not sure this is the best way to use this technology or that this technology is the best. The U.S. glass companies are now getting very actively into this subject with our company and looking at the

whole situation, to see if there are better ideas that utilize this technology that we can spring from.

So I think we should give this a little time and do the research before we do any mandating. Right now the only people that can do the process is this company in France, and we in fact shipped these windshields over there and had them coat them.

Senator RIEGLE. Is it that complex to apply or is it that they have the patent rights and therefore you have got to deal solely with them?

Mr. KEHRL. I really cannot answer that question. I think the glass companies would be in a better position to do so. I understand they have patents, but I am sure we can learn how to do it. And I think we may be able to learn better ways of doing it than we are seeing right here now.

Senator RIEGLE. Well, that may be so, although I think from my point of view it seems to me that what you have here is a very powerful illustration, and I think in a sense you are convinced by it and I am convinced by it. And I would hope that, rather than delaying inordinately until we have the perfect answer, which we may never get to, there will always be improvements and variations on down the line, as there are in every other part of the car design, whether it is related to safety or fuel efficiency or what have you.

And it seems to me that if we have got something here that we know is a measurable improvement, that we ought to find a way to go ahead and incorporate it. And then if we find that there are ways that we can further improve on that, then, you know, let us go to stage 2 or stage 3.

But I think that probably, in the experience of all of us, we have either all been in crashes where we have seen injuries like this occur or we know people that have been. Certainly I do, and it seems to me this is precisely the kind of thing that, as you say, a cooperative attitude can help us find and get to and put into place.

I would like to see us move along. I would hope that we would not find inertia in the process of working out an understanding with Government people, with the agencies, or what have you, and that we could find a way to go ahead, because I think—I also think that not only is there the gain from people who will not be badly cut in accidents, and there have to be hundreds of thousands of accidents occurring in which precisely this kind of thing happens. If we only have 11 percent of the people buckling up, we have a lot of heads hitting windshields.

So this has the potential to be very helpful to a lot of people immediately. I think that every time there is a showing like this of not only the scientific advance but also the willingness and the desire of everybody involved to incorporate it, that that becomes a very powerful message and a very powerful illustration of concern, good motives, good purposes, looking for things that are improvements.

And it seems to me we have got one here that looks pretty convincing. I appreciate your bringing it and I would like to see us move ahead with it.

Mr. KEHRL. Well, we will certainly be guided by that. I can tell you that over the past several months there have been meetings

between our people and the glass companies. There have been research efforts in our laboratories to make sure this is the final best way to go. There has been work in our design groups on how we can incorporate it, and some talking to the engineering groups.

So we are not ignoring it at our company, and we appreciate your comment.

Senator RIEGLE. I might just say one other thing and then I will be finished here. That is that a very dear friend of mine is John Dolsa, who was a senior engineer at the Buick Motor Division for many years in Flint, and a wonderful inventor and human being. I once asked him, you know, if we were to try to design the perfectly safe car what would be involved.

Well, as he finished describing it we would have a car about a block long and about a half a block wide. I mean, if that were the only goal, to make the car absolutely impervious to any kind of an outside mishap and to protect the person to a 100 percent level, that you could do that, but you would not have a car that you could drive or move around in very well.

So obviously we are not going to get to an absolutely perfect answer. I think in a sense that may apply here.

What is it likely to cost, just a rough range here? I know you do not have precise numbers. But the addition of this kind of a laminated material, if we were into production and we were doing this on an everyday uniform basis, are we talking about a very expensive—

Mr. KEHRL. If we were doing it in this country, is that what you are saying?

Senator RIEGLE. Yes. In other words, we got to a full production level.

Mr. KEHRL. Well, the numbers that I have seen—and they are rough—would say in the area of \$50. But my feeling is that we should learn how to do it for much less than that.

Senator RIEGLE. Yes, I would think that if you get up to something like 6,000, 8,000, 10,000 units a year—and we hope to get there, again, and even above that—and as you are learning costs improve, I would think that we ought to be able to do this pretty efficiently. This looks to me like the kind of thing that would be very highly cost-effective.

I would just want to encourage you in every way I could, because I think these are the kinds of things that the public understands, the public appreciates, values, and I think it shows that we can make progress and that we are making a good faith effort to try to find ways to make improvements that are going to help people.

Thank you.

Senator DANFORTH. Thank you very much, Mr. Kehrl.

Mr. KEHRL. Thank you, Mr. Chairman.

[The statement follows:]

STATEMENT OF HOWARD KEHRL, VICE CHAIRMAN, GENERAL MOTORS

Good morning. My name is Howard Kehrl, and I am vice chairman of General Motors. I am pleased to have the opportunity today to discuss GM's work in auto safety and the different ways technological improvements become available to consumers.

We were honored, Mr. Chairman, to have you visit us in Detroit earlier this year to tour our Technical Center and Proving Ground. I would like to extend an invita-

tion to members of your committee to take a similar tour of our facilities and examine for themselves the work that goes on there.

At these facilities and others like them around the world, General Motors conducts the most advanced safety-related research in the industry. More importantly, we can say that the United States has the best highway safety record in the world—and it is improving. In 1982 the United States experienced its lowest fatality rate ever. Of course, this record represents the effects of good roads and good drivers as well as safe cars, but if this record were not as outstanding as it is, I don't believe we would take the same kind of pride in the research we are doing at General Motors. This is the subject of these hearings today, to discuss how the kinds of safety improvements that are developed in the laboratory and tested at our proving facilities can be put to work on the highway. This is a very important consideration at General Motors, because while other organizations may perform research as their end product, we have customers who demand that we translate our research into practical and affordable improvements in the safety of the cars they drive.

SAFETY BY DESIGN

Often, these improvements are signalled by the introduction of new components on our vehicles. A few examples are the energy absorbing steering column, high penetration resistance windshields and child restraint systems.

These safety improvements were prompted by field accident research and development programs, some of which began as early as the late 1950's. Taking the steering system as an example, we learned from our accident data that about half of serious and fatal injuries were in frontal crashes. Because each crash had a driver behind a steering assembly, we recognized that the steering assembly had the potential to be a passive restraint. Accordingly, the GM Research Laboratories pioneered studies into the injury tolerance of the human chest. (This research led to the injury criteria NHTSA uses today.) From these studies we derived the design characteristics of the energy absorbing steering columns that became standard in all GM domestic cars in 1967. Recently, the National Highway Traffic Safety Administration (NHTSA) found that in frontal crashes the risk of a driver fatality has been reduced by 12 percent, and the risk of serious injury to the driver has been reduced by 38 percent, as a result of steering system improvements.

This example of how a single technology can have a very high pay-off, does not mean, however, that it would be prudent to focus all of our safety effort on one area or on a particular technology. Such concentration—especially on so-called high technology hardware, could diminish our effort in other areas that ultimately might offer greater benefits to our customers. We need to keep our focus on the reduction of harm to car occupants, and this often leads to improvements that involve very subtle transformations: a change in the design of door latch hardware, a new choice of materials or structure to improve the way a car crushes in a crash, or the use of more energy absorbing material in vehicle interiors. These kinds of improvements are not "high tech" add-on's; they are intended to reduce harm to occupants and must be designed into the vehicle from the beginning.

Not only has GM led the industry in the development of discreet and visible safety improvements, it has also been a leader in developing the basic technology that permits more subtle refinement. General Motors has a unique program to gather specific information about the circumstances and results of accidents that take place in the field. We use this data as a starting point for our designs. Computer modeling and extensive product testing are then employed to improve vehicle design, occupant protection and the way the forces generated in a crash are distributed throughout a vehicle.

This is the most basic and most important kind of safety development work that can be performed. It may lack the glamour of an air bag and receive less media attention, but it is an absolutely fundamental procedure that cannot be overlooked in developing and assessing automotive safety. We have been designing safety into our products for many years, improving them as new technologies give us better insight into the way cars and their occupants react and interreact in all kinds of accidents.

Today, advanced computer-aided design techniques allow us to predict and refine these interactions even before a prototype is built for testing. (A description of infinite element modeling, a particular computer aided design technique used to improve occupant protection capabilities is described in the booklet, "Safety and Small Cars.")

This kind of built-in safety, often obscured by more visible safety features, has resulted in a flow of improvements from the laboratory of the market year after year.

Perhaps one indication that our designs are paying off is the high rating GM cars have achieved based on insurance injury claims. In 1982, 15 of the top 17 cars identified by the Insurance Institute for Highway Safety were GM models—a record of which we are indeed proud. Of course, this record is influenced also by the size of our cars, and by whom and where they are driven.

VOLUNTARY STANDARDS

A number of means are used to assure that the benefits of the safety improvements we develop reach our customers. Frequently, such improvements are made unilaterally by a manufacturer or through the development of voluntary industry standards adopted by all manufacturers. These industry standards represent performance and design criteria developed independently by engineers drawn from all segments of the auto engineering community. When the government first adopted federal motor vehicle safety standards under the National Traffic and Motor Vehicle Safety Act, it based the majority of its initial standards on practices already adopted or scheduled for adoption by the industry. Today, federal safety standards have largely preempted voluntary standards, but the work of independent engineers in this area continues and, in some areas, such as international harmonization of lighting standards, actually leads government regulation.

GOVERNMENT REGULATION

The most obvious effort now to provide at least a minimum level of vehicle safety is by government regulation. General Motors has always supported, and will continue to support, practical regulations that provide benefits to consumers at reasonable cost. We are greatly encouraged by the present Administration's efforts to improve regulation. The Administration has refined the regulatory regime and has even eliminated a few standards that did not provide real safety benefit or were not cost effective. It is also establishing research programs with industry that can lead to rulemaking proposals on which the entire safety community will comment. Through this coordinated effort government and industry are working together to maximize the effectiveness of the nation's resources available for safety research. For example, NHTSA and the Motor Vehicle Manufacturers Association are coordinating research efforts on side impact, steering assembly impact, accident data refinement and many other areas. Their coordinated research does not address the overall stringency of any regulations that might result. It is aimed instead at identifying areas where vehicle changes would be beneficial and developing valid means of measuring safety performance in these areas.

The coordinated research NHTSA and the motor vehicle manufacturers are conducting is encouraging. However, there is a significant need for more research that can provide the basis of future safety developments to reduce total harm to vehicle occupants. In particular, better biomechanics technology is needed for assessing neck injuries, injuries from side impacts and all injuries in the severe-to-fatal range.

Another important aspect of the regulatory reform effort was the Reagan Administration's decision to lower bumper test speed requirements from 5 mph to 2.5 mph. We believe NHTSA's comparative analysis of the benefits of 5 mph bumpers and pre-regulation bumpers supports the agency's decision to seek a more cost-beneficial standard. We do not consider the change in the bumper standard to be a safety issue—nor do others who follow this issue. It is therefore outside the subject of this particular hearing. However, the Center for Auto Safety and the Insurance Institute for Highway Safety (IIHS) made statements at the February 17 hearing that were misleading and in some cases in error.

These groups have concluded that the 1983 bumper systems do not offer the improvements in fuel economy or the reductions in cost that those who supported the switch to a 2.5 mph standard said they would. This judgment is incorrect. Weight savings from the new bumpers translate directly into fuel savings. GM, for one, has announced cost savings on 1983 models and passed these on to its consumer.

Another important point overlooked at the February 17 hearing is that much of the benefit of the 5 mph bumper standard was due to its requirement that bumpers be the same height. This has not changed in the new rule. Moreover, the energy absorption capability of bumpers under the current rule is three times that of pre-standard bumpers. Any bumper that meets the 2.5 mph rule provides significantly better protection than pre-standard bumpers.

General Motors believes the 2.5 mph bumper rule offers substantial value to consumers. Under the new standard, bumpers are becoming less expensive and more fuel-efficient than recent designs. Judgment about their actual performance in accidents should be based on data gathered from real world experience, not on labora-

tory tests that never have been correlated to the wide range of accidents that happen in the real world. GM and other manufacturers are cooperating with NHTSA in its effort to collect data and generate reliable information about how the new systems perform in the field. It is this type of information, rather than the predictions of critical observers, that will determine the acceptability of the new bumpers under the requirements of the Information and Cost Savings Act.

INNOVATION

Although the majority of federal safety standards provide real benefit to consumers, some of their provisions may become obsolete as new technology is developed. We believe one example of this may be the federal requirement for scratch resistance of windshields. This requirement was included in the original standard to insure that windshields could withstand rubbing and cleaning without scratching. It appears the standard may be too stringent, however, with respect to the interior surface of windshields, since it has had the effect of disqualifying from use in this country the anti-lacerative windshields used on some vehicles in Europe. These European windshields include a layer of plastic on the interior side of the windshield that reduces significantly the chances of even small facial cuts being inflicted by windshield broken in an accident.

GM recently asked for and received government approval to test a fleet of 2500 vehicles equipped with experimental anti-lacerative windshields to determine whether these windshields would be suitable for use in this country. This test continues work begun in the early 1960's when the introduction of high penetration resistance windshields eliminated extreme lacerations from windshields in almost all accidents.

I have here today sections of windshields removed from vehicles crash-tested at our Proving Ground in Milford, Michigan, as well as the chamois cloths worn by the vehicles' dummy occupants to simulate human faces. If you stop by the display and run your hand gently over the interior surfaces of the two windshields, you will see the difference between the rough, cutting edges of broken glass on the inside of the standard windshield and the smooth surface of the anti-lacerative windshield. The effects of this difference can be seen clearly by comparing the torn surface of the faccloth from the dummy that contacted the standard windshield and that of the dummy that contacted our experimental anti-lacerative windshield.

Important questions will need to be resolved before these windshields can be installed in most cars in this country. NHTSA would have to change the federal standard for abrasion resistance, and it would be desirable to establish a manufacturing capacity for the windshields in this country. We must also demonstrate that exposure to extremes of temperature and climate over a long period of time does not cause these windshields to discolor or otherwise reduce a driver's ability to see through them. We are pleased, however, to have the opportunity to test the windshields, and we consider NHTSA's expeditious action to permit the test an excellent example of cooperation between industry and government to further the safety of the motoring public.

TARGETING IMPAIRED DRIVERS

So far I have discussed some of the methods used to make proven safety features standard equipment in all automobiles. The potential applications of every safety feature, however, are not this broad. In cases where it is not appropriate to make a particular equipment standard, industry and government can cooperate to identify specific applications in which the safety feature can be effective.

An example of this is GM's research on vehicle-borne hardware that administers pre-driving tests to detect drunk drivers. After experimenting with many different types of pre-driving tests throughout the 1960's GM adapted for automotive use a device developed by the National Aeronautics and Space Administration. The device is called the Critical Tracking Task. If a driver fails the test, the car can be designed so it will not start, or will operate only at low speeds or trigger an alarm system to alert other drivers and enforcement officials.

Obviously, the Critical Tracking Task is not for everybody. After we had determined that an impaired driver warning system would be feasible from an engineering point of view, GM turned the CTT over to the Department of Transportation. We understand the National Highway Traffic Safety Administration is nearing completion now of a field test of the CTT in Los Angeles, using drivers who have been convicted twice of drunk driving. Initial results of the program suggest the device may be successful in preventing multiple drunk driving offenders from operating a vehicle while they are impaired.

Whether the CTT becomes a significant element of the effort to deter impaired drivers will not depend on technical refinements that remain to be made, but on evidence of its potential for public acceptance. Experiments like the one the government is conducting now in California will help to demonstrate whether such potential exists.

PUTTING SAFETY TO WORK WITH POSITIVE INCENTIVES

As the drunk driver reminds us all too often, it is not always enough to build safe cars. We also must do everything we can to encourage safe driver behavior. One of the ways General Motors has found to encourage individuals to make the most of the safety equipment available in their cars is by offering positive incentives. Behavioral research performed by Professor Scott Geller of Virginia Polytechnic Institute demonstrated that it was possible to modify behavior dramatically with respect to seat belts by offering rewards for the desired behavior (that is, buckling up) and publicizing these rewards. This concept formed the basis for positive incentive programs being conducted now at selected GM sites and slated for introduction this spring at two of our manufacturing facilities in Indiana and New Jersey. In these programs, employees who agree to wear their seat belts become eligible to win prizes in company-sponsored contests, provided certain overall usage goals are met.

At the sites where these programs have been put into effect we have achieved usage rates between 70 and 100 percent. At the GM Technical Center, in Warren, Michigan, where prizes have not been offered as incentives since last October, usage remains at almost sixty percent. I do not have to tell you that this is well above normal levels—and very good news for GM as an employer.

At the present time GM is supporting an outside research program to demonstrate the feasibility of applying this concept in a municipal setting.

The same principle of positive incentives appears to underlie plans offered by some insurance companies to increase benefits for policyholders who wear their seat belts. Motors Insurance Company, a subsidiary of General Motors, announced such a plan last year, and we are pleased that Nationwide Insurance and State Farm Insurance also offer positive incentives to encourage their customers to buckle up. The primary beneficiary will be their clients who buckle up, but the companies will benefit also from a reduction in their injury claims losses.

EDUCATION

While prizes and premium discounts have an important, if unexpected, role to play in increasing highway safety, there is no question that education is the most reliable way to insure a continued demand for safer cars and continued attention to safe driving. The government has a natural role to play in this area, and we are encouraged by the NHTSA's current campaign to educate Americans to the importance of wearing seat belts. Such education must be continuing, however. I do not believe we will see a significant or sustained increase in seat belts use in our country until all of us in industry and government commit ourselves to encouraging the use of seat belts on an ongoing basis.

Another important aspect of the public's education on automotive safety is the availability of useful consumer information about the relative crashworthiness of new cars. We support NHTSA's efforts to develop information on this subject that is meaningful and which reflects real-world conditions.

General Motors has taken several steps to complement government efforts. We are supporting NHTSA's national seat belt effort by providing educational materials to employees, organizing positive incentive programs, and sponsoring a national campaign of print and radio advertisements that promote seat belt use. Our corporate advertising also provides information to our customers about GM's safety research activities, the performance records of our products in field accidents, the importance of child restraint use and the danger of drunk driving. In addition, GM recently increased its role in driver education programs and expanded it to include assistance to commercial training programs.

To familiarize the media with the mechanics of automotive safety, GM conducted an all day briefing last year at our Milford Proving Ground. Reporters from newspapers and radio and television stations across the country met with our executives and engineers, and toured the laboratories where we develop our occupant protection technology. Members of the media viewed barrier crash tests and sled tests specifically designed to demonstrate the advantages of seat belt use.

We believe a sensitivity to the forces involved in an automobile crash could be a significant influence on the way the media reports automotive news.

PUBLIC INTEREST IN SAFETY INCREASING

The combined effect of all these activities by the government, the automobile manufacturers and the insurance companies appears to be an increase in the public's awareness of safety issues. Car buyers today are placing an ever increasing value on safety in choosing a car. This is extremely important, because ultimately, it is this interest and this demand that gives safety its place in the showroom.

Thank you.

[The following information was subsequently received for the record:]

QUESTIONS OF THE COMMITTEE AND THE ANSWERS THERETO

Question. Features of automobile interiors—such as energy absorbing steering columns, high penetration windshield glass, and energy absorbing instrument panel surfaces all provide passive protection for vehicle occupants. What types of technological advances have occurred over the years at GM regarding such passive protection? What degree of protection does this provide vehicle occupants in terms of preventing death and injury?

Answer. GM's objective in improving passive protection for vehicle occupants is to address real world needs, defined by analysis that uses the best field data available. GM developed the first production energy-absorbing steering column and assumed a major role in the development of high penetration resistant windshields. Both these features, which are passive in nature, were developed and installed in GM cars before they were required by federal safety standards. GM's safety development work continues in such programs as the current U.S. field evaluation of anti-lacerative windshields. GM also has advanced significantly the use of energy-absorbent designs in instrument panels, and was the first manufacturer to offer an air bag option and the first to put full front seat air bags in the field. The creation of the side guard beam, a high-strength corrugated steel beam built horizontally into car doors to improve protection in side impact, was first announced by GM's Fisher Body Division in 1969 and was incorporated in GM cars in advance of the federal standard. Much of GM's effort to improve occupant protection is directed to the vehicle structure outside the passenger compartment, in order to improve the way a vehicle distributes and absorbs the tremendous energy involved in a crash. Occupant protection depends on this energy management capability, as well as on the structural integrity of the passenger compartment.

In a recent study of field accident data the National Highway Traffic Safety Administration (NHTSA) concluded that improvements in steering columns have resulted in 1,300 fewer fatalities and 24,000 fewer serious injuries per year due to steering column impact. NHTSA has also estimated that improved fuel system integrity annually has reduced related fatalities by 400, serious injuries by 510 and moderate injuries by 110. Improvements in side impact protection are credited with avoiding 480 fatalities per year and over 24,000 injuries. Although uncertainty remains about some conclusions reached in these studies, we believe the figures cited here represent reasonable order-of-magnitude estimates.

It is clear that practical, affordable improvements in passive protection have reduced significantly the number of fatalities and injuries on our highways. GM is proud to have helped make those advances possible. We cannot ignore, however, the challenging perspective offered by another NHTSA estimate: that seat belts and child restraints, used widely and on a regular basis, could reduce fatalities and serious injuries to vehicle occupants by more than 50 percent. We agree with that estimate, and we urge everyone to assist in raising the level of usage of the restraint systems already in almost every car today.

Question. In a June 1982 press release, you stated that the axiom "safety doesn't sell" cars is not true today, if it ever was. In fact, you noted that public opinion polls show that American new-car buyers are giving increasing priority to the inherent safety and reliability of the vehicle in their purchase decisions. Based in technological developments in recent years however, it appears that considerably more safety could be built into cars. What can be done to stimulate more consumer interest in safety features of cars?

Answer. There is no question our customers place a very high value on safety in the cars they buy. Moreover, many car buyers who do not express safety as a conscious concern in their purchase decision are probably not ignoring safety as much as assuming it. General Motors takes this expectation seriously, and we are committed to providing the safest practicable products for our customers. This commitment is essential to our competitive position because success in our industry depends

upon customer loyalty and repeat business. When a product develops a reputation for being unsafe—whether or not this reputation is deserved—experience shows that sales suffer badly and it is likely some customers may never return to that manufacturer.

While Americans are very interested in safety, there appear to be limits on what they will do to increase the level of safety in their cars. We support driver education, child restraint laws, mandatory seat belt use and better enforcement of drunk driving laws because all can improve highway safety. The national belt use educational effort now underway also have our support because unless Americans learn the importance of being restrained in a crash, we believe they will continue to object to using or paying for occupant restraints of any type.

Innovative programs underway at GM sites to encourage belt use by employees and behavioral research performed at other locations demonstrate that positive incentives have a dramatic potential for modifying behavior with respect to seat belt use. We believe that positive incentives and a sustained commitment to education in the areas of vehicle dynamics and personal risk will help assure that the demand for safe cars continues.

Question. In your testimony, you state that the weight savings that result from 2.5 mph bumpers translate directly into fuel savings. In layman's terms, how do you reconcile this with NHTSA's estimate that 2.5 mph bumpers would save only 2 to 35 gallons of gasoline over 10 years? What type of fuel savings do you envision over a comparable period with the current generation of 2.5 mph bumpers on GM cars?

Answer. Critics of the 2.5 mph bumper standard are attempting to discredit it by suggesting that bumpers on cars manufactured since the new standard took effect do not provide the savings in weight, cost and fuel that proponents of the revised standard claimed. The reason that level of benefits is not observable now is that most bumpers produced since the standard was changed are not 2.5 mph bumpers. Almost all of them are heavier, less fuel-efficient and more costly than they are going to be when manufacturers have made all the changes possible under the new rule. The bumpers on some GM cars, for example, have not as yet been changed at all. On others, it has been possible to make small changes almost immediately. For example, on some vehicles, we removed some minor components, used different rubber in the bumper guards and made other minor design changes. We are already passing the savings from these changes on to our customers. Significant changes remain to be made that will take us much closer to a 2.5 mph performance level. These changes, however, will require new tools or a complete redesign of the vehicle. To avoid extra cost for our customers, GM has decided not to make these bigger changes until we reach the point where we would be buying new tools or redesigning a particular vehicle anyway. We do not expect to see a GM car that offers the optimum savings possible under the new rule before the fall of 1986 (1987 models). GM and other manufacturers discussed these lead time considerations during the public debate on the proposed 2.5 mph rule. We are confident NHTSA and other objective parties whose involvement in the debate was significant understood this situation at the time the new rule was promulgated.

The current generation of new bumpers includes some 5 mph bumpers, a few newly designed 2.5 mph bumpers and many bumpers whose performance level lies somewhere in between. Using only three of the newly designed 2.5 mph bumpers, the Insurance Institute for Highway Safety (IIHS) estimated that fuel savings attributable to the new bumpers were between 2 and 35 gallons over the life of the car. This is misleading, because these three designs do not adequately represent the savings that will result from redesigning all cars, and even the designs cited may be further refined in the future. Although IIHS said it derived the 2 to 35 gallon figure using NHTSA methodology, the safety agency's estimate of the potential fuel savings under the new rule is quite different. In its Final Regulatory Impact Analysis of the change in the bumper standard NHTSA used this principle: that every pound saved would translate into one gallon of fuel saved over the life of a vehicle. GM data support this principle. We expect that after vehicles are redesigned to optimize the effects of the new standard, the average new GM car will consume 45 gallons less fuel in its life. In the context of designing and developing a new automobile for fuel-efficiency, this number represents a very large improvement in fuel economy.

If similar weight savings are realized on all cars, the new rule will result in a national fuel savings of half a billion gallons per year.

Senator DANFORTH. Next, Mr. Christopher Kennedy of Chrysler. Thank you, Mr. Kennedy.

**STATEMENT OF CHRISTOPHER M. KENNEDY, DIRECTOR OF
FEDERAL GOVERNMENT AFFAIRS, CHRYSLER CORP.**

Mr. KENNEDY. Thank you very much, Mr. Chairman, Senator Riegle, for the opportunity to discuss traffic safety before this committee. I would like to outline some of the things we are doing now and some of the things we will do in the future to improve the safety of our vehicles.

As a background to these remarks, we should remember that the highway fatality rate is lower today than ever before. This is the result of decades of work on improved highways, driver education, State safety programs, improved automobiles, Government safety standards, antidrunk driving campaigns, and the 55-mile-per-hour speed limit. There have been many advances in each of these areas to reduce both the number of accidents and the severity of injuries in them.

In our business, automobile manufacturing, Chrysler has thousands of engineering standards and requirements to insure safe performance. Safety is an integral part of all Chrysler design, development, and production processes. Virtually every aspect of vehicle performance is controlled by one or more Chrysler performance requirements. In addition to our own specifications, NHTSA has added several dozen comprehensive safety standards.

With that background, let me discuss work already under way to improve the safety of the cars we will build in the future. Because so much work has already been done, at times we must use new tools and techniques to improve performance. Fortunately, we have some of these tools today.

NHTSA has developed the most sophisticated accident data base in the world. This information from the real world is far more valuable than laboratory testing and lets researchers answer questions which could not be answered only a few years ago. We have already begun to use this information and it will help shape the design of the cars of the future.

Along with other auto manufacturers and the Government, we are investigating these data to find out how people are injured, what it is that injures them, and what we can do about it. We chose first to look at side impacts, because they account for about one-third of all serious injuries.

In phase one of this work, we investigated injuries in real world accidents to define what injuries occur in side impacts and what causes them. We are now in the second phase of this research, identifying vehicle performance characteristics which may reduce or prevent these injuries, and testing different concepts. We will soon begin to consider performance requirements for production cars. We hope to complete this work next year.

We will soon begin a similar research program on steering column performance. We agree that there is potential for improvement in both side impact and steering columns, and we support the activity in both areas wholeheartedly. We expect to go on to investigate other areas in the near future.

Now, let us move a little closer to the present. There are 20 million safety belt users in this country, even at 10 or 11 percent belt use, and we expect that number to increase. That is plenty of

market incentive to make us improve our belts so that they appeal to prospective buyers and induce owners to use them.

In our 1984 models next fall, we begin to introduce our next generation of safety belts. They are easier to put on and are more comfortable to wear. Obviously, we hope more people will use them. These belts are a good example of marketplace demand producing improved safety systems.

We believe public interest in safety belts will increase. The national safety belt campaign, coordinated by NHTSA, will increase public understanding of the need for belts and should persuade people throughout the nation to use them.

We are doing our part. Every one of our print advertisements encourages people to wear safety belts. We are doing more than that, however. In recent years there have been a number of programs which met with great success in increasing belt use. They all have one thing in common. Instead of punishing nonusers for failure to wear their belts, as we used to do, they reward people who do wear their belts.

This is an old technique, but one applied only recently to safety belt use. Thanks to the examples of General Motors, the University of North Carolina and others, we now know how to increase belt use sharply. At Chrysler we will kick off a pilot belt use incentive program for our employees in the spring of this year, and we expect very good results.

Now a word about the cars we are building today. There is evidence that an improved safety belt reminder system will increase belt use. The reminder system on most of today's cars, a buzzer or other audible warning which sounds if belts are not fastened, is of short duration. Apparently most people learn to ignore it. We believe we can do better.

This year, as an option on many of our cars, we offer an audible message center. A computer-controlled voice from the instrument panel literally talks to the vehicle occupants when there is something they ought to know. For example, if the engine is overheating it says in a clear voice "Your engine is overheating." If the fuel level or windshield washer fluid level is low, it tells people that too, and a lot of other things when required.

These messages come only rarely, when and if they are needed. On the other hand, every time the vehicle is started and the driver has not put on his safety belt, the voice says, "Please fasten your safety belt." It repeats that message if the belt is not fastened. It is very hard to ignore that message. When he does put on the belt, the car says "Thank you."

The audible message center is another example of the marketplace at work. We introduced it because we think it is a better way to tell drivers about their cars and because we believe that people will like it. Our owners and dealers will tell us if we are right or point out to us how to make it better.

For the belt reminder part of the system, there is another way to gauge success. We have arranged to work with NHTSA to measure belt use rates in cars with these reminders and compare them to cars without it.

Will this work better than present safety belt reminder systems? We think so. Based upon the reaction of people in the cars I drive

myself, it will. Is it the final answer? Perhaps not, but it should lead us toward one.

We have a car with this system parked on Delaware by the elevator entrance. I invite you and the audience to try it for yourself when we are finished here.

In conclusion, we have a fresh approach to increasing belt use in our 1983 cars. We will introduce improved belts in 1984 which, in conjunction with educational campaigns and other incentives, should increase belt use. We are also engaged in basic research which will produce new performance requirements for side impact, steering columns, and other aspects of future cars.

These advances will come through both industry-Government coordinated research and through the demands of the marketplace. We think both will continue their strong influence on safety development in the future.

I thank you and I will be happy to answer your questions.

Senator DANFORTH. Do you think safety sells?

Mr. KENNEDY. I think it sells if it is visible to the customer, as we hope to demonstrate in a moment.

Senator DANFORTH. Is it fair to say that the U.S. auto manufacturers have not stressed safety in the past?

Mr. KENNEDY. We have certainly stressed it in our products. We have not stressed it in our advertising. One of the reasons is nobody knows how to measure safety. We have no tests which we can point to, nothing that the FTC would allow, probably, which would let us say that one car is safer than another.

We do not know how to do it, sir. There is no test to measure the overall safety of an automobile.

Senator DANFORTH. But there have been published reports of the safety of various automobiles by the Government itself—fatalities per so many miles and so on. They have always shown, to my knowledge, that U.S. automobiles are very safe compared with Japanese automobiles.

If I were an automobile manufacturer, I think I would have a very aggressive campaign to sell safety and to take the position that, while U.S. cars are safe or Chrysler cars are safe, Japanese cars are not. Yet, it just seems to be so understated. GM had a modest—I do not know whether it was modest or not, but I just saw a very few samples of it myself, a campaign to demonstrate the safety of GM cars.

But by and large, it is something that is resisted. I have noticed in this subcommittee, that the auto industry really does not want to talk much about safety. It does not even want claims made about its own products. That has always seemed to be a mistake.

So it just occurred to me that if we are relying on public awareness and public acceptability of safety, and yet neither the industry nor the Federal Government are particularly promoting it, it is a little bit hard to see how the intention will be translated into reality.

Mr. KENNEDY. Well, if you refer back to those General Motors ads you will notice that they were heavily laced with disclaimers about the vehicle characteristics involved. There were also driver characteristics involved in those ratings and there were roadway

characteristics involved. All of those disclaimers were either stated or implied.

We chose not to use information which may have been more a measure of driver performance than vehicle performance, and we do not really think we should attribute to our vehicles something which may be a result of driver characteristics.

Senator DANFORTH. So you think that it is just inherently difficult to make safety claims?

Mr. KENNEDY. It is very difficult to make a safety rating on one vehicle through testing to compare it with another. We think both Government and industry should work towards such tests, but there are none at the moment.

Senator DANFORTH. Do you view Chrysler's relationship with NHTSA as being a friendly, cooperative relationship or an adversarial relationship?

Mr. KENNEDY. I mentioned some of the coordinated research. We are very pleased to be able to work both with other manufacturers and the Government in doing basic research. Overall, we believe that from the Safety Administration we receive a fair hearing, and that is all we ever ask for.

Senator DANFORTH. Do they want to press you faster than you want to go?

Mr. KENNEDY. In some instances their standards may have deadlines which we think are too soon, but overall we think they are reasonable men.

Senator DANFORTH. That is what I am concerned about. It seems to me that their role should be to push you faster, much faster than you really want to go, and that there should be some tension and an adversary relationship. That can be overdone by administrative agencies. They can be such adversaries that all reason is lost and they are in the business of baiting you. But I do not think that that could ever be said about NHTSA.

My observation of NHTSA is that they are extraordinarily cautious in pressing anyone to do anything. Maybe we could stand a little more aggressiveness.

Mr. KENNEDY. We are ready to move as fast as we can.

Senator DANFORTH. Senator Riegle.

Senator RIEGLE. Let me just say at the outset, you are here representing Chrysler, which many of us, including the two Senators present, are quite proud about in terms of the performance that the Chrysler Corp. has turned in over the last 2 or 3 years.

I thought it was significant that, after we were able to come through the hardest days and with the help of the Federal Government put the loan guarantees in place, that Chrysler was the No. 1 performing stock on the New York Stock Exchange last year.

Mr. KENNEDY. We noticed that, yes.

Senator RIEGLE. That to me was probably as tough a test in the big leagues as you can have, and I think it was an extraordinary measure of the job that has been done there on all fronts. I really take my hat off to you and the others in the company, the workers, the management, and everybody else who participated in what is really one of the, I think, most dramatic stories of a turnaround situation that we have seen in decades in this country.

It has helped the country. It has produced and added to the gross national product and the employment base. There have been enormous gains all around. I would not want the occasion to pass without noting the fact that you and the others with the company have really, I think, done an extraordinary job and have helped the country in the process.

Mr. KENNEDY. We thank you very much. It has taken a lot of work and we are very proud of it.

Senator RIEGLE. You saw the windshield designs here on the table during the last witness, the plastic laminate on the inside of the windshield. That looks like an awfully good development.

Is that something that Chrysler is pursuing as well?

Mr. KENNEDY. We have not pursued it because NHTSA—until just recently—would not allow it. Now that it becomes available to us, we surely will pursue it.

Senator RIEGLE. I want to urge you to do that. It looks to me like that is the kind of thing that is an improvement of consequence and I think one that the public would value.

I also want to say that I think it is—you have noted that you have mentioned in our advertising the value of people buckling their seat belts.

Mr. KENNEDY. Yes.

Senator RIEGLE. I think that is important and I applaud you for doing that. I think in every way that has to be done.

I think in the Federal Government, for example, we now have some efforts underway to require Federal employees during the day when they are in official vehicles to wear seatbelts. I think they should. I think there should be a requirement to that effect. I think Government employees on the job during the day, whether in officially designated cars or whatever kinds of vehicles they might be that have seatbelt equipment, ought to wear it, ought to be required to wear it. I would hope that the habit would carry over into the off hours.

But it seems to me we here on the Government side can do something constructive along that line, given the fact that the equipment is there. We know it reduces injuries, we know it saves lives. So I would hope that we could see some more movement on our own side in that respect, because we are talking about a fair slice of—a fairly large slice of the American population that would be affected just by that initiative, which the Government itself can take.

I have no other questions at this time, Mr. Chairman.

Senator DANFORTH. Thank you, Senator Riegle.

Thank you very much, Mr. Kennedy.

Mr. KENNEDY. Thank you very much, Mr. Chairman.

[The following information was subsequently received for the record:]

CHRYSLER CORPORATION,
Detroit, Mich., March 24, 1983.

HON. JOHN C. DANFORTH
U.S. Senate,
Washington, D.C.

DEAR SENATOR DANFORTH: Thank you for your letter of March 17 and the opportunity to supplement our testimony of March 11. Your letter asked two questions. The first expressed interest in the current research project on side impact; the second asked about future industry research activities.

The attached material outlines in some detail what has been done so far in the coordinated NHTSA/industry program on side impacts.¹ It describes work currently underway and outlines that which remains. In summary, this work can be divided into three general phases: The first phase was an extensive investigation of the problem; this was done by an intensive study of NHTSA and industry accident data. It defines the types of injuries which occur in side impacts, and pinpointed the portions of the automobiles which are involved. This phase is complete, and has provided foundation data for phase 2. Phase 2 will develop countermeasures to reduce side impact injuries, and is well underway. The goal is to produce prototype hardware as well as test procedures and test equipment against which we can evaluate future vehicle designs. Phase 3 will produce specifications for future vehicles and describe performance tests which they should meet. We expect to complete this work in the fall of 1984.

Your second question asked if, in the absence of new government regulations, would automobile manufacturers perform sufficient research to ensure progress in automobile safety? We cannot speak for other manufacturers. However, we believe that the industry as a whole would continue safety research and development, continuing a long history of safety development by vehicle manufacturers. Today we take many of these industry developments for granted. They include energy absorbing steering columns, laminated and tempered safety glass, energy absorbing instrument panels, hydraulic brakes, steel bodies, radial tires, safety belts, disk brakes, and many more safety items. In fact, most of the early NHTSA standards, such as high penetration resistant windshields, safety belts, collapsible steering columns, etc., were developed by industry. Early NHTSA standards simply required them on all new cars as standard equipment. A Government Accounting Office study for the Congress found that these early standards are far more productive in saving lives and reducing injuries than later standards developed by the agency itself.

We are doing research today to develop improvements for future cars, quite apart from NHTSA requirements. This work is proceeding according to established scientific procedures. As described above, the first step in good research is to define and quantify the problem. In the case of our joint industry NHTSA research on side impacts, this required use of the extensive NHTSA accident data bank to determine the quantity and specific causes of injuries in actual traffic accidents. The next step is to develop potential countermeasures. Next, we will fabricate prototype hardware and necessary test equipment. We will then use these prototypes to evaluate the performance of countermeasures and to select the one most promising. These will form the basis for performance specifications for future automobiles. The last step will be to monitor the actual accident performance of cars designed to meet these performance specifications to ensure that they are reducing injuries or accidents in accordance with the design goal.

Each of these above steps is essential and each depends upon the one preceding it. The first and last steps are critically important. Without fundamental research into accident data provided by NHTSA, we could not proceed. NHTSA's contributions are absolutely essential. For reasons which we do not understand some people both in and out of government have criticized this cooperative NHTSA research and development program. They are wrong. It is certainly the quickest way to bring next generation safety improvements to the public. We hope that you and others interested in improving automobile safety will do your very best to encourage this type of activity in the future.

Sincerely,

C. M. KENNEDY.

Senator DANFORTH. The next witness is Roger Maugh of Ford.

**STATEMENT OF ROGER E. MAUGH, AUTOMOTIVE SAFETY
DIRECTOR, FORD MOTOR CO.**

Mr. MAUGH. Mr. Chairman, good morning. Thank you for this opportunity to testify on this very important subject of automotive safety technology.

At Ford, safety is an integral part of the design, engineering, and manufacturing process. It is a day-to-day responsibility of all of our

¹ Materials not printed in the hearing record have been retained in the committee files.

people. We think our cars today are safer than they have ever been and that their safety characteristics will continue to improve.

Partly because cars are safer today, the United States has the best traffic safety record in the world. This safety record continued to improve in 1982. Overall traffic deaths dropped 10 percent, from nearly 50,000 to 45,000, despite an estimated 1 percent increase in the miles traveled. We believe this trend will continue because of actions planned in the areas of driver safety awareness, the highway environment, and vehicle safety technology.

As encouraging as the 1982 experience has been, the highway toll is still much too high and we must all continue our efforts. Ford is committed to progress in each of these areas.

A significant reduction in car occupant fatalities, from 27,000 to 24,000, also occurred in 1982, continuing a decade long downward trend, from a level of about 35,000 in 1972. At least one-half of the remaining fatalities could be prevented if occupants would wear their safety belts. NHTSA's safety belt awareness program is clearly an essential part of further safety progress.

Ford is contributing to this effort by making our safety belts more comfortable and easier to use. We have provided thousands of safety belt promotional films to driver education classes. We put safety belt reminders in all Ford vehicles and in Ford advertising.

We put safety belt street signs on company property to remind employees to buckle up, and we have also required seatbelt use on company business and encouraged employees to follow this practice wherever they drive.

Ford continues to urge adoption of State mandatory safety belt use laws. Ford has helped to promote laws requiring mandatory protection for child passengers, now in force in over 20 States. We are also working with State and local governments to followup on the efforts of Congress last year in enacting incentives for enforcement of drunk driving laws.

Turning to the highway environment, Ford strongly supported the major highway financing bill enacted by Congress last year. This new funding will enable communities to maintain primary roads in safer conditions.

The focus of today's hearing is on vehicle safety technology. Advances in auto safety technology must reflect the combined efforts of the researcher, the accident statistician, and the design and manufacturing engineers. Government and industry must work together to define key safety problems.

We must learn more about how accidents and injuries actually occur to identify the opportunities for progress and the performance criteria against which engineers can evaluate their designs. In a number of areas, this process is underway.

One area of technology that continues to attract major interest is the inflatable occupant restraint system. Inflatable restraints have been identified as potentially promising, especially when used in conjunction with safety belts, but there are still a number of issues that must be addressed before their suitability for widespread use can be verified. These include on-the-road performance and effectiveness, consumer acceptance, and willingness to pay the premiums for this kind of technology, system replacement experience, and how to avoid unrealistic consumer expectations.

We think NHTSA is on the right track toward getting these issues resolved with its GSA fleet project. The concentration on driver only systems and recognition of the inflatable system as supplemental to proven seatbelt systems will help us to get this fleet in place at an early date. Fleet use is an important first step in the development of this technology and in the assessments of effectiveness and user acceptance. Ford is doing the work necessary to enable us to bid on this project.

Other promising areas of vehicle technology that are the subject of current industry-Government safety research are improved side impact and steering system protection. The first phase of this research is to analyze accident data and identify the most important causes of injury. The next important step is to translate this knowledge into meaningful and repeatable test criteria, against which new designs can be compared.

These criteria in turn will assist manufacturers in evolving safer designs for future products. As this work proceeds, Ford hopes to be able to utilize the results to improve side impact and steering system performance of its cars in the mideighties.

Another technology with injury-reducing potential is the addition of a plastic layer on the inside of the windshield. Since last summer, Ford has been cooperating with the Maryland State Police, who are road-testing a fleet of 50 LTD police vehicles equipped with the Securiflex windshield, which may provide a new level of protection against occupant lacerations.

We expect that information from these field tests and other studies underway by Government and industry will help to determine the practicability and effectiveness of this technology.

Mr. Chairman, yesterday you saw one of these Ford police cars which had been in an accident. While we do not know all of the details of the accident, it appears that the windshield worked as it was expected to.

A technology which may have good potential for improved accident avoidance, particularly under adverse weather conditions, is antiskid brakes. Recent breakthroughs in microprocessor technology, improved sensing systems, and miniaturization of components appear to present opportunities for faster acting and more efficient brakes at potentially lower costs than earlier antiskid systems. As these developments prove out, such systems will naturally make their way into production.

Mr. Chairman, at this point I would like to add a point that we did not include in our written comments about the importance of the marketplace in encouraging development of safety technology. If the market accepts the higher level of technology, such as antiskid brakes, that acceptance will clearly influence manufacturers to invest more resources in making them available.

This same sort of relationship is working in the bumper area. Manufacturers, insurance companies, and the public are now all involved in a competing and evolutionary process of evaluating alternatives that will eventually identify the optimum choice. As you know, Ford stayed this year with the 5-mile-an-hour bumper protection level under the new standards because we think that is the best tradeoff we can give our customers with the current technology.

Ford is encouraged by efforts underway in both Government and industry on safety-related systems such as I have just described and is committed to doing its part so as to advance the state of the art in automotive safety. Coordination of Government and private sector efforts is essential.

This is true not only of driver education and highway improvement, but also with respect to basic vehicle safety research. We disagree with recent criticism of coordinated industry-Government research efforts under the leadership of NHTSA researchers. We believe that these efforts should instead be commended for striving to identify those areas of vehicle technology showing the greatest promise for improved accident avoidance and reduction of injuries and fatalities and for doing so in a way that does not impinge on the independence or integrity of either Government or industry researchers. We cannot hope to accomplish our mutual goals in an adversarial environment.

Thank you. I would be happy to answer any questions you might have.

Senator DANFORTH. Thank you, Mr. Maugh.

I would like your very general advice. Let us suppose that you were retained as a consultant to the Federal Government on the question of what we should be doing that we are not now doing to further the cause of motor vehicle safety. What steps could we take? What sort of approach should we take which would really help us save lives? What would your advice be?

Mr. MAUGH. Well, I think that the type of hearings that you are holding now are a good example of the way in which we need to get together to reach a consensus. As I have listened to the last 3 days of hearings, I think there is reasonable consensus. We all agree that we need better highways, we need better drivers, we need better cars.

And the problem is a very complex one. It is an interaction of all those three major segments, and each one has its own difficult problems and it has its own demand for resources, and society obviously is going to have to make tradeoffs.

Clearly, the thing that you can work with and that has the best opportunity in the short run is to use the restraint systems that are in the cars today. I think everybody agrees that the potential is there. The problem is finding just exactly how to unlock that potential. So obviously I think this is an area where we need a lot of effort.

We happen to think that a mandatory seatbelt use requirement is a practicable way to solve that issue, or at least to move further along it. It has been proven in 25 or more countries around the world and there is no reason why it cannot work here.

Senator DANFORTH. But it has not been proven in this country, has it?

Mr. MAUGH. It has not been proven in this country because it has not been tried yet.

Senator DANFORTH. For example, there was testimony yesterday, as I recall it, that with respect to truck drivers, there is a mandatory requirement and yet the usage is about 6 percent.

Mr. MAUGH. I understand that. And of course, once again, it is a question of willingness to use the belts. Somehow, along with the

requirement there has to be incentive on the part of the public to use the belts. It is a two-edged sword.

But I think you can look at other places, Canada for example. A number of the provinces have a mandatory use requirement. Their society is very much like ours and they have made it work.

Senator DANFORTH. There is a difference of opinion on it. You think that and yesterday the witnesses thought no, that it would have no effect, and they gave some examples. For instance, based on just checking people as they were driving in and out of a military base where there was a seatbelt requirement, it was found to be not too effective.

But the problem is that if they are right and you are wrong, then to divert attention to that kind of effort, if it is not going to in fact accomplish something, is to divert it away from improving the structure of cars themselves.

Mr. MAUGH. I do not want to imply that we should not continue to try to improve the cars themselves. I think that is also important. The vehicle is one of the three elements of this equation, and certainly cars today are safer than they have been. But there are things we can do.

I mentioned today a number of areas of technology that we think are promising. We think all of those have promise. They all have differing relationships. Some are accident avoidance, some protect the occupant. Some are low cost and should be easy to do. The windshield is a good example. Some are very high cost and they have a question as to whether they really will do the job they are intended to do. The airbag falls into that category.

We think the airbag has a lot of potential, but it needs a fresh start. There are a lot of misconceptions about it. People think that it provides automatic 100 percent occupant protection, and it does not. You have to wear a seatbelt with it. That gets us back to the problem of using seatbelts.

So no matter how you approach this equation, with 140 million vehicles out there, with \$14-billion worth of seatbelt equipment already in place, we think that is the place to start.

Senator DANFORTH. Senator Riegle.

Senator RIEGLE. What was the figure you just cited?

Mr. MAUGH. We have estimated that the cost for an average seatbelt system at the consumer level is about \$100, and there are 140-million vehicles out there, and if you multiply it out that is \$14-billion worth of seatbelt equipment that is in place today, with only 10 percent of it being used.

Senator RIEGLE. I think that is a significant fact. A \$14-billion investment to be made in equipment that works quite well, it is cost effective, it is relatively inexpensive, given the level of protection that it provides if it is used.

The problem is that, whether it is 10 percent or 11 percent, in that range, that is the level of usage and 89 to 90 percent of the people who have the equipment are not using the equipment. So it sits idle. It sits idle as an economic investment that is unused, but more importantly it sits idle as a physical protection that does work, does prevent serious injuries in most cases and loss of life. And we are missing those benefits.

The people who have the seatbelts are not using them, are running that higher risk for themselves and really for the country, because these losses, as they pile up—as one of our earlier witnesses said, the net loss figure to the country in a year from injuries that could be prevented by the use of these protective devices is on the order of \$53 billion a year. It was a figure that he used, and so that really is a breath-taking number.

And if you think of it in terms of all of the broken bones and broken hearts and broken lives of people who are hurt, that is a figure that is really far greater.

So I think you made a very important point when you said in passing that if we had airbags you also have to have seatbelts in place. In other words, for airbags to really do the job they are designed to do you have got to have the other passive restraint equipment, the seatbelts, in place and on the person riding in the car for this dual protection system to work.

And if you have one without the other, if you have the airbag without the seatbelts, then you are not going to get the level of protection that needs to be gotten. So it seems to me, having already taken the step with seatbelts and we have made the national investment, they are in the cars, they are there to be used, and in any event you would have to have those to make the next technological addition, whether it be airbags or whatever, work, then you have to have the first step being used.

So it seems to me that by any yardstick you have got to solve that problem. It seems to me that everything that we can think of to try ought to be tried to get people to use the belts that are there now.

I mean, the fact is that seatbelts save lives and they save serious injuries. I do not understand why it is that we do not have 30-second spots on television that really show what happens to people who do not use them. I am talking about things that are so vivid and so dramatic that they really are jolting to people.

But I think that is what it takes, because I am not sure people can visualize what an accident means unless they have been in one themselves and unless they actually see how a person's face is disfigured or they see that someone is injured beyond any kind of repair, and can see this in direct, vivid, personal terms, I am not sure that it becomes real enough, that it becomes compelling enough, that people are going to put these belts on.

And we can do things like that. We can get the story out. If there is one thing we know how to do in this country, it is we know how to communicate messages. Every house today pretty much has a television set. People watch them all the time. And there are ways, if we make a national commitment to deliver this message, that the message can be delivered.

And everybody has a part to play. We have a part to play. The President certainly has a part to play. I think the automobile companies do. I know that they are participating in a variety of ways to try to get this message across.

But it seems to me that until we recognize that we have to solve the seatbelt usage problem first, that going beyond that is not some answer to our problem that we have not yet discovered. I mean, we have an answer, we have it in place. We cannot get people to use

it, and it seems to me that that has to be the driving focus of the effort here.

I was saying earlier that even with Federal employees, Federal employees in my view, when they are in the course of their normal work day, ought to be required to wear seatbelts in each and every instance, whether it is done with a combination of positive incentives and negative incentives. I think there ought to be absolutely no exceptions to that rule.

People ought to be required to do it as a matter of just reducing the risk to themselves and economic loss to the public and to the Government in their service were they not to have this kind of protection in place that is available to them.

Do we have studies that show what airbags themselves do by themselves, without the seatbelts also being on?

Mr. MAUGH. Most of the work that has been done on estimating the effectiveness of various types of restraints has been done by the Government, and I think the estimates are that in terms of saving lives or reducing serious injuries the airbag by itself unquestionably is less effective than the seatbelt by itself, both used.

Obviously, if you wear a seatbelt and you have an airbag and you are in a high energy collision, then you are going to potentially get some additional benefits. So that is why we are concerned about the airbag and why we think it needs a fresh start, that it should be identified as a supplemental system.

It should not be sold to be used without the seatbelt, because you are passing up protection in low-speed accidents and protection in second hits and rollovers, and these are fairly high frequency types of situation.

Senator RIEGLE. I think this is clearly why we have to solve the seatbelt problem first.

We have three other witnesses and we must finish by noon, so I am going to forebear.

Senator DANFORTH. Thank you very much, Mr. Maugh. I appreciate your being here.

The GSA is going to submit its testimony, I very much appreciate this.

[The following information was subsequently received for the record:]

QUESTIONS OF THE COMMITTEE AND THE ANSWERS THERETO

Question. In your testimony you stated that a vehicle occupant needs to wear a seat belt with an airbag. Certainly this would afford the greatest occupant protection in a crash. However, the Subcommittee has also heard testimony asserting that an airbag alone can be effective crash protection. How do you reconcile these statements? Must a vehicle occupant wear a seat belt in order for an airbag to provide effective protection?

Answer. Inflatable restraints are designed to provide protection for the occupant in frontal impacts. The effectiveness of such restraints in side, rear and rollover type accidents is very limited. The NHTSA published effectiveness estimates of air bags with and without lap belts as part of its earlier rulemaking on passive restraints (Docket No. 75-14; Notice 10: 42 Fed. Reg. 34289 et seq., July 5, 1977):

	Air bag	Air bag and lap belt	Memo: Lap and shoulder belt
Abbreviated injury scale injury level:			
1.....	0	0.15	0.30
2.....	.22	.33	.57
3.....	.30	.45	.59
4 to 6.....	.40	.66	.60

While these estimates indicate that air bags alone would provide additional protection in frontal accidents for otherwise unrestrained occupants, they also indicate that a lap belt must be used in conjunction with an air bag to even approximate the overall effectiveness of the combination lap and shoulder belt system that is installed in virtually every car now in use in this country.

Question. We heard testimony before this Subcommittee on February 17 that Ford had retained the 5 mph bumpers on all of its 1983 cars. We also heard testimony as to widespread consumer interest in obtaining cars with 5 mph bumpers. Given this consumer interest, why don't you advertise the durability of the bumpers on Ford cars, especially as compared to other automobiles?

Answer. As indicated by the question, Ford is aware of the public's interest in damage resistance and will continue to take actions responsive to consumer needs. Ford believes its bumper systems provide consumers with efficient and technically up-to-date products offering good protection in low speed impacts. Furthermore, we are very cognizant of today's competitive market involving factors such as insurance industry discounts and surcharges that create incentives to provide practicable bumpers that will meet consumer demand for performance, and earn discounts and avoid surcharges. For instance, in a recent press release Allstate made the following comment:

"We are pleased that Ford Motor Company and some other manufacturers have decided to retain bumpers on their cars that withstand 5 mph impacts." Haayen [President, Allstate Insurance Company] said "Favorable make and model ratings afforded those cars that will retain stronger bumpers will be maintained."

While we have not directly advertised the details of our bumper systems' performance, in August of 1982 we utilized reduced Allstate insurance rates on our 1982 Ford Escort and Mercury Lynx is a major advertisement to alert the public that at least one major insurance company believed our products performed well with respect to all major insurance coverages—including collision.

For the future, we expect that bumpers will become more involved in the buying decision because of greater differences in bumper design and performance between competing car lines. This will, in turn, tend to increase the involvement of bumpers as an advertising subject. Ford is aware of this potential and is considering plans to provide more coverage of bumpers in its new model advertising.

Question. In your testimony you referenced Ford's work with the Maryland State police in the area of nonlacerative windshields. What have been your findings to date in this program?

Answer. Last September, the Maryland State Police began installing windshields to which a plastic coating had been applied by Saint-Gobain Vitrage in 50 of its LTD police vehicles. The vehicles have accumulated approximately 25,000 miles each since the windshields were installed. To date there has been one accident of which we are aware. The plastic film performed as expected. Beyond this, fogging and scratching have not been problems to date, but it is too early to reach any conclusions regarding the performance of these windshields and we are continuing to monitor the fleet.

Question. You stated in your testimony that a number of issues need to be addressed before the suitability of airbags for widespread use can be verified. What has been Ford's research history and experience related to airbags?

Answer. Attachment I and Attachment II present a summary of Ford's research on inflatable restraints over the years. As can be seen, Ford has been active in air bag research and development since 1957. These efforts represent well over \$100 million in resources at current economics and include two fleet tests that provide significant design-related information.

Notwithstanding this long history of development, there remain a number of key issues that must be resolved before air bags are verified for wide use. For example, today's estimates of effectiveness for inflatable restraints are primarily based on the experience of about 10,000 1964-76 full-size GM cars equipped with air bags. This is

far short of the 500,000 car years of field experience needed to develop statistically reliable conclusions regarding the actual effectiveness of inflatable restraints. There also are open issues relative to consumer acceptance of inflatable restraints and their willingness to pay a premium for this type of restraint system once the public understands its dependence on seat belt use. More needs to be learned, also, with respect to system replacement probabilities (i.e., will deployed systems remain unrepaired?), and how to avoid unreasonable consumer expectations about the safety performance of inflatable restraints. Ford believes that these issues must be addressed before widespread application is attempted.

ATTACHMENT I

FORD MOTOR CO. AIR BAG DEVELOPMENT SUMMARY

Ford's early air bag development program (1957-1976) was presented in some detail as part of the supplemental submission to the Office of the Secretary of Transportation on Docket 44, September 17, 1976. This description is included as Attachment III. A discussion of Ford's more recent air bag development work appears below.

During late 1976 and early 1977, the Company negotiated with the Secretary of Transportation on the specifics of a voluntary air bag test fleet. This program was intended to provide both Ford and the Department of Transportation with a test fleet for ascertaining the likely degree of consumer acceptance of the passive restraint system. Ford's participation in the program was expressly conditioned on the absence of any proposal to require that new cars be equipped with passive restraints since any such requirement would have precluded development and use of the driver-only system to be employed in the test fleet.

The test fleet was to consist of 1980 and 1981 model year Fairmounts and Zephyrs. Target volume for the program was 135,000 units over the two year period. The marketing plan was to have vehicles available in every major market with appropriate promotion. Price of the driver-only RPO test system was to be only \$50 (which was unrealistically low even at that point in time), or such greater amount as GAO might determine would be the price of such a system in full production.

The 1980 Fairmont Program was intended to be a driver-only air bag system. The other occupants were intended to be restrained with conventional active belt systems. The driver seating position would have had an active lap belt and knee bolsters for incremental protection. The air bag module planned for this program would have utilized a pyrotechnical gas generation device.

In June, 1977 the NHTSA issued a rule amending 208 to require that passive restraints be phased-in by wheelbase beginning with large cars in model year 1982. Not only did this decision abrogate the agreement upon which the voluntary test program was based, but the timing/implementation phase-in program directly conflicted with the demonstration program. Not only would the test program not be able to supply timely, meaningful data regarding public acceptability of passive restraints, but it was also being conducted on vehicles scheduled for the middle year of the phase-in period. At this point, Ford had to apply its resources to the development of specific means of complying with FMVSS 208, and the 1980 Fairmount air bag program was terminated.

With the introduction of the mandatory passive restraint regulation, automatic belts were programmed as the standard restraint system for the 1982 Ford, Mercury, Lincoln and Mark VI car lines, with air bags as an option to provide three-across front seating. Corporate plans also called for an effort to achieve early introduction of air bags on the 1981 Lincoln and Mark VI.

The 1981 Lincoln and Mark VI air bag hardware development program was an extension of the previous 1980 Fairmont air bag demonstration program. When air bag development efforts were redirected from the 1980 Fairmont to the 1981 Lincoln program, hardware development of the driver system was intensified and passenger module designs were initiated. The Lincoln and Mark VI air bag system consisted of the following hardware: A driver air bag module and cover; a passenger air bag module and deployment door; an electronic diagnostic module; crash sensors; wiring harness; driver knee bolster; and lap belts.

Along with these items, additional supporting structure for the air bag components and a new steering column and wheel were required. Several different inflator concepts were considered during the 1980 Fairmont and 1981 Lincoln and Mark VI air bag programs. Both the stored gas inflator, which contains nitrogen gas stored under pressure, and an augmented inflator, which uses stored gas augmented

by a small pyrotechnic element, were dropped in favor of a pure pyrotechnic inflator, which utilizes a solid fuel and oxidizer to produce the required inflation.

Development work at both Ford and its suppliers targeted toward 1981 introduction on Lincoln and Mark VI continued through late 1979. Concern was expressed over the performance of the low-mounted passenger air bag with respect to out-of-position occupants, particularly small children. In December 1979 a special test program was initiated to evaluate the potential of air bags causing injury to children. To permit modifications resulting from the special testing to be incorporated prior to volume introduction, it was decided to defer the program until 1981½. A trial build of 50 air bag cars for engineering evaluation was scheduled for job #1, 1981.

During late 1979 and 1980, it became increasingly obvious that dramatic and apparently permanent shifts were taking place in the U.S. automobile market. The planned gradual phasing out of full size vehicles was accelerated because of consumer demand for smaller, more fuel efficient cars. As a result, volume for the Ford and Mercury vehicles for which air bags were being developed dropped significantly, and the car lines were planned for early replacement. As a result of the anticipated short cycle life of the Ford and Mercury air bag program, the low installation rates, and the high consumer cost anticipated for the option, the 1982 Ford and Mercury air bag program was cancelled in April, 1980.

Continued development of the Lincoln and Mark VI air bag during 1980 raised additional system performance issues with regard to meeting both Federal and Corporate performance objectives. Driver air bag performance levels, although meeting or exceeding Federal requirements, degraded as hardware became more representative of production levels. Additionally, difficulties in maintaining sufficient design margins to ensure certification capability, as well as out-of-position occupant performance, indicated that revisions to the passenger bag assembly and deployment door were needed. To maintain a competitive position, yet allow time for resolution of Federally related and Corporate issues, the Lincoln and Mark VI air bag program was deferred in July, 1980 to Job No. 1, 1982.

Continued deterioration of the large car market, a shortened anticipated cycle life for the large Lincoln and Mark VI, continually rising variable and retail costs for the air bag option, development of a non-coercive, detachable passive belt system, and low installation rate projections led to the cancellation of the production Lincoln/Mark VI air bag program in February, 1981. However, a limited build of 33 cars was completed. Twenty-five of the cars were leased to the Dearborn Police Department for rapid mileage and accident accumulation, and the other eight cars were evaluated by Ford and its air bag system component suppliers. The test vehicles accumulated over 1,700,000 miles and were involved in thirty-one accidents, of which only two caused air-bag deployment. Both deployments occurred in frontal crashes of low severity (delta V of approximately 9 mph) that probably would not have resulted in any significant injury if the air bag had not been present. Although no experience related to effectiveness was obtained due to the absence of any severe frontal impacts, a number of engineering problems were discovered, and the experience should be valuable in developing future air bag programs.

ATTACHMENT II

SUPPLEMENTAL SUBMISSION OF FORD MOTOR CO. ON OCCUPANT CRASH PROTECTION

APPENDIX 1

MAJOR DEVELOPMENTS IN FORD'S PASSIVE RESTRAINT PROGRAM

A. Ford's long-standing Airbag Development Program

Ford has long been interested in the potential of automatically inflating restraints. The earliest formal Ford air bag design study, dated January 1957, preceded NHTSA's original notice by some 12 years. It described an air cushion for front seat passengers, a steering wheel mounted air cushion, and a combination inflatable front seat head restraint and rear seat passenger cushion.

In this early work, Ford research engineers established that development of feasible air bag restraints depended upon two key elements: a sensing device which could trigger the bag when—and only when—it was needed, and the means to inflate the bag quickly. Experimental crash tests provided information regarding both impact forces and time elapsed between initial vehicle impact and the second impact, that of the occupant against vehicle interior.

Ford's first attempt to demonstrate the inflatable restraint concept was made by a group of research engineers, who used a small rubber life raft and ran a series of

experiments on inflation times. They investigated a number of gas sources, including the gas-storage concept and the gas generator concept, as well as a combination of both. Results were, to understate the case, disappointing. They indicated that it was then impossible to inflate an air bag in 40 milli-seconds or less—the approximate time between the initial vehicle impact and the time when the passenger begins to move forward relative to the vehicle interior.

Between 1958 and 1965, the inability to achieve bag inflation within the desired 40 milliseconds continued to impede progress. Research engineers concluded in March 1966, however, that use of a detonating valve developed at the White Sands Proving Ground might provide the answer to that problem.

Ford researchers also learned that Eaton, Yale and Towne, Inc. ("Eaton") had tested a preinflated pneumatic restraint system of their own design. Ford and Eaton embarked on a cooperative air bag restraint system research and development program.

Ford/Eaton completed two states of a program designed to establish concept feasibility of an air bag restraint system during 1967. The first stage was an attempt to demonstrate that it was possible to transfer gas rapidly from a high-pressure vessel to a large, low-pressure vessel. Inability to control the size of the resulting aperture was a serious problem. The second stage focused on pressure vessel development tests. These tests established that the best design was to place a detonator in the neck of the pressure vessel to create an aperture of a controlled size, a design which appeared to make it possible to achieve desired inflation rates.

Ford and Eaton engineers presented a comprehensive technical paper on air bag development at the annual meeting of the Society of Automotive Engineers in January 1968. The authors reported the results of 42 crash simulator sled tests and one barrier crash test conducted in the process of attempting to establish concept feasibility for air bag restraints. (Kemmerer, Chute, Hass and Slack, "Automobile Inflatable Automatic Restraint System," SAE Paper 68033, (1968).

Also in 1968, in an effort to define the air bag sensor environment, Ford conducted road tests which measured vehicle accelerations under normal operating conditions. During this period, Eaton developed a sensor sensitive to longitudinal accelerations.

Concurrently, research engineers ran tests to determine the type of gas to be used for bag inflation. Nitrogen was selected for use in all subsequent experimental installations. Carbon dioxide was rejected on the basis of evidence showing that it would pose even greater problems than nitrogen in attaining an acceptable inflation rate. The investigation of gas-generating explosive materials was given lower priority, due to heat generation and a concern over toxicity levels.

With component and system requirements tentatively defined, Ford's program established priority for the location of an air bag to protect the right front passenger. The driver of a Ford car was protected by the combination of a compressible steering column and a steering wheel with a large area pad and force-yielding rim. Ford therefore judged that the right front installation offered a greater potential for reducing injuries. By the end of 1968 the Ford air bag research program had progressed to a point where research engineers could recommend that a design be developed for front seat passengers in a full-size car.

Ford then ran a number of crash-simulating sled and frontal impact barrier tests with experimental versions of the proposed air bag restraint module. These tests, however, revealed serious performance deficiencies in design. Briefly, the major functional problems were that: A standing child with its face close to the area of bag deployment might be subjected to extremely high accelerations during bag inflation; in an angular vehicle-to-vehicle frontal crash test, the air bag was ineffective in restraining the occupant because it deployed late; and major deformation of the instrument panel occurred during bag deployment, creating sharp edges in the area of possible occupant contact.

Ford concluded that the standing child impact problem was probably inherent in that design approach. A new design approach resulted in different module dimensions, and made obsolete previously adopted vehicle installation plans. Subsequent laboratory tests of the new design approach led to a mistaken belief that the standing child problem could be readily resolved. At the same time, instrument panel deformation was increased. Ford decided nevertheless to continue air bag development efforts, concentrating on such additional problems as inadvertent deployment, failure to deploy, noise and the danger in multiple impact collision from an excessively distorted panel.

In 1970, with assistance from both Eaton and Allied Chemical Company (which has entered the air bag development field), Ford found that repositioning the air bag module lower in the instrument panel would reduce panel damage. Concurrent-

ly, Ford decided to develop new hardware for installation in a fleet of 1971 Mercury sedans for a Company-use field test.

The 1971 Mercury program was designed to result in the following: Acquisition of assembly plant shipping and handling experience; determination of the impact on facilities for storage, handling, and shipping of air bag modules; determination of special fixtures and tooling needed for the next stage of the field test program; evaluation and development of manufacturing sequences; design prove-out at assembly line speeds under production conditions; determination of adequate design clearance from existing instrument panel; components; and determination of sensor reliability.

Ford left the modules in the test cars uncharged because of concern that the air bags might actually injure occupants upon deployment. Concern once again centered on the standing child and a newly discovered problem—that of the unrestrained occupant forced forward into the panel by panic braking prior to a collision. The modules did incorporate firing units to test whether deployment would occur in collision accidents and whether inadvertent deployment might occur.

None of the 92 vehicles built in the 1971 model year program was ever involved in a serious accident, and there were no inadvertent firings. However, Ford obtained valuable information on essentially all of the engineering issues. Four of the vehicles were subsequently equipped with "live" modules and put on durability test, again without experiencing inadvertent actuations.

B. Ford's terminated plans for a phased introduction

In December 1970, Ford stated:

"Ford continues to believe in the potential of passive protection systems, including the inflatable device known as the air bag. Indeed, Ford was the first vehicle manufacturer to study and undertake an active development program to perfect such a device. We have expended substantial effort to this end and have committed to a phased introduction in our vehicles."

Continued work and evaluation convinced Ford that this program should not be implemented.

Continuing concern with the standing child and out-of-position occupant problems, as well as the high noise levels of detonation, promoted further investigation. Ford, Eaton and Allied conducted hundreds of developmental tests during 1971 in an attempt to overcome these problems. These unresolved concerns caused Ford to cancel a study to offer air bags as a production option on one car line in 1973.

Although its tests were not fully successful, Ford nevertheless proceeded with its plan to build a test fleet of up to 1,000 1972 Mercury cars with latest design "live" modules, and actually established a fleet, consisting of 831 vehicles. These vehicles were to remain in service for 40,000 miles or 18 months, after which time the air bag modules were to be removed and returned to Ford for testing.

Ford was constrained to post warnings in each vehicle emphasizing the need to wear lap belts and to keep children out of the front passenger area. The warnings also advised persons less than 60 inches tall not to sit in the right front seat because of the danger that a deploying air bag would strike the person's head.

The 1972 Mercury test was intended to assess the air bag in the assembly plant and under actual field conditions. Several problems were discovered and resolved during a pre-production build of five vehicles. During the remaining production run, only two significant problems arose. First, 83 units were found to have defective connections requiring a field repair and, second, pressure levels in another series of units had to be rechecked. A total of seven of this second series of units was found to be faulty.

Also during 1972, Ford evaluated steering wheel mounted systems, both stored gas and pyrotechnic, with vented, non-vented, controlled shape and uncontrolled shape bags. Those efforts failed to result in a system that satisfactorily met the intent of the standard.

By 1972, Ford studies showed that lap and shoulder belt systems were likely to be more effective than air bags in preventing injuries and deaths. At belt usage rates exceeding 60 to 70 percent, overall safety benefits were indicated to be greater for belts than air bags.¹ At the same time, the final requirements of FMVSS 208 for passive systems remained uncertain. Ford faced a serious risk that the air bags it had developed would not comply with those requirements. Ford accordingly dropped a plan to install air bags in 1974 Fords and Mercurys as an option.

¹ These comparative studies relied heavily on laboratory test results for both bag and belt effectiveness. There is sufficient field experience today so that such heavy reliance on laboratory data for evaluating belt effectiveness is unnecessary and inappropriate.

Ford initiated a study to install an aspirated air bag system into Pintos in 1973. The purpose of the study was to determine the implications of an air bag system in a small vehicle. Ford built three experimental vehicles for testing. The study and test program demonstrated the possibility that head and chest injury criteria of the Standard could be met in a research environment, but femur loads remained high. It was thought, though not proven, that this design, which included a flow control device within the inflator, could meet the criteria in the case of a standing child.

In 1973 Ford also carried out development testing on two new air bag systems; an aspirated system using a pure pyrotechnic inflator as the primary gas source, and a stored gas aspirator for application in cars requiring protection for two front seat passengers. That work pointed toward use of a pyrotechnic inflator and a sealed bag as the primary driver restraint system. Open issues regarding femur loads, containment, and environmental effects (temperature and aging) still were not resolved.

Late in 1973, Ford initiated a vehicle test program to determine the repeatability of test results using the procedures of FMVSS 208 for vehicles with passive restraints. That program, which involved 33 air bag-equipped Mercury cars, is described in Versace and Berton, "Determination of Restraint Effectiveness: Air Bag Crash Repeatability," SAE Paper 750395 (1975). The test program provided evidence that FMVSS 208 procedures did not lead to repeatable results.

Ford's efforts since 1957 to develop a safe and effective passive restraint system have resulted in a significant advance in the state-of-the-art. Ford has spent approximately \$23 million in the past seven years on that effort. Ford, however, has not succeeded in developing a system that, from a safety or economic point of view, could justifiably be offered to the public based on our present state of knowledge of air bag effectiveness.

[The statement follows:]

STATEMENT OF L. L. MITCHELL, ASSISTANT ADMINISTRATOR, OFFICE OF FEDERAL
SUPPLY AND SERVICES, GENERAL SERVICES ADMINISTRATION

Mr. Chairman, I am Lester L. Mitchell, Assistant Administrator of the Office of Federal Supply and Services of the General Services Administration. On behalf of the Administrator, Gerald P. Carmen, I want to express my appreciation for the opportunity to offer testimony today on the subject of how Government and industry can work together to bring improved automobile safety technology to the marketplace.

This morning, I would like to provide you with an overview of our responsibilities relative to the acquisition of Government motor vehicles, discuss GSA's actions relative to the steps we have taken to enhance motor vehicle safety, and our recommendations for additional initiatives which would encourage the use of automobile safety devices by the Government and the public.

GSA'S ROLE IN GOVERNMENT VEHICLE ACQUISITION

GSA is the centralized contracting office for the purchase of non-tactical, commercial-type vehicles for the executive agencies of the Government and for GSA's own interagency motor pool system. As part of our procurement function, GSA is responsible for the preparation of specifications which describe and classify the types of vehicles to be procured. Included in the specifications are quality, performance, functional and technical capabilities of the vehicles. In addition, GSA implements policy on engineering matters relating to vehicle safety.

In addition to our motor vehicle procurement responsibilities, GSA's motor pool system operates over 85,000 vehicles at locations throughout the United States. The large-scale use of Government automobiles and the accompanying possibilities of employee injuries resulting from this usage, requires GSA to obtain automobiles for Federal employees that are as safe to operate as is reasonably possible. In order to reduce procurement costs, we generally purchase vehicles with the minimum equipment required to meet the Government's needs. However, under the direction of Administrator Carmen, we at GSA have made the commitment to balance our interest in economies of purchase with concern for the safety of the Government's employees.

GSA'S USE OF SAFETY TECHNOLOGY

While GSA is interested in the safety of Federal motor vehicle operators, the Government is concerned that the public have the option of acquiring safety devices for their personal vehicles. It was in this light that in October 1982, GSA determined that it should make its motor vehicle fleet available for certain safety device demonstration programs.

We are proud that GSA has taken the lead in helping to bring vehicle safety technology into use by the Government. Along this line, we are presently working closely with the National Highway Traffic Safety Administration [NHTSA] in developing an interagency agreement to demonstrate airbag effectiveness in compact motor vehicles. We are moving forward in the use of this technology. In fiscal year 1984, GSA will buy compact sedans with airbags.

Under the proposed 1983 interagency agreement with the National Highway Traffic Safety Administration, GSA intends to procure 5,000 compact sedans with original equipment driver air cushion restraints. The vehicles with airbags will be closely monitored. GSA will keep detailed maintenance records for the air cushion restraint-equipped vehicles. Individual reports will be made on each airbag equipped vehicle involved in an accident that includes detailed damage and injury information. In accidents where there is an air cushion restraint deployment, a NHTSA accident investigation team will be dispatched to analyze the accident.

We believe this program will provide current data to:

- (a) Document the fatality and injury reducing effectiveness of new generations of air cushion restraints;
- (b) Provide additional exposure of this technology to the public to encourage significant acceptability of optional air cushion restraints in the marketplace;
- (c) Demonstrate the operational characteristics (reliability, maintainability) of the systems themselves;
- (d) Demonstrate that the industry will incorporate air cushion safety devices in vehicles without regulation; and
- (e) Encourage private fleets to purchase driver-side air cushion restraint system equipped vehicles.

The benefit of airbags as safety equipment is limited to frontal direction vehicle impact. With this in mind, GSA has purchased and installed high-mounted, high visibility third brake lights on suitable vehicles in the interagency motor vehicle fleet. Department of Transportation reports indicate that approximately one-third of all rear-end collisions could be avoided with the installation of this safety equipment. We believe that "For the cost of a tank of gas" GSA will decrease the risk factor to Federal Employees operating government vehicles and accrue a significant cost avoidance in vehicle repair charges.

While installation of additional safety devices is important, we also believe that attention should be directed to the one device already present in vehicles: The seat belt. Statistics indicate that if passenger car occupants used safety belts at all times, at least 12,000 lives would be saved annually. In view of these statistics, on November 8, 1982, GSA issued an administrative order requiring GSA employees to use safety belts—both lap and shoulder belts—when operating or riding in any vehicle on official business. This order further states that each motor pool vehicle must be equipped with safety belts and requires that safety belts be kept workable at all times. In addition, we have issued a Federal regulation requiring use of safety belts by Federal employees, of all agencies, when operating or riding in a Government vehicle.

CONCLUSION

Before closing, I would like to make the following recommendations. Whenever motor vehicle manufacturers develop a new or improved item which has the potential for improving the safety of motor vehicles, bring it to GSA's attention. We encourage manufacturers to keep us apprised of technological advances that may be suitable for use by GSA or other Federal agencies.

During the last year, GSA has been streamlining its operations and restructuring its procurement and supply system in order to provide more cost-effective wholesale and retail support to its Federal agency customers. At this time, with few exceptions, the government's vehicles are procured by GSA. Because we consolidate vehicle requirements, we are able to obtain significant savings on vehicles, as well as on any optional equipment, such as safety devices.

We recommend that Congress required Federal agencies to continue to purchase their vehicles, as well as their other goods and services, through GSA. Such consolidated requests would provide manufacturers with a substantial market for items generally not purchased on a small scale because of their price. In the case of safety devices, large-scale aggregate purchases would decrease the government's cost while encouraging manufacturers to eventually offer the devices as options for individual automobile owners.

I would like to thank you once again, for this opportunity to address the Senate Subcommittee on Surface Transportation. Please be assured that GSA is committed

to working with Government and industry in improving automobile safety technology.

[The following information was subsequently received for the record:]

GENERAL SERVICES ADMINISTRATION,
FEDERAL SUPPLY SERVICE,
Washington, D.C., April 11, 1983.

Hon. JOHN C. DANFORTH,
Chairman, Subcommittee on Surface Transportation, Committee on Commerce, Science and Transportation, U.S. Senate, Washington, D.C.

DEAR SENATOR DANFORTH: This is in response to your letter of March 17, 1983, concerning my testimony on the General Services Administration's (GSA's) motor vehicle safety initiatives.

Although you were not able to hear my testimony on March 11, 1983, I want to express my appreciation for the opportunity to place my remarks into the Congressional Record.

GSA is committed to enhancing motor vehicle safety and to encouraging the use of new automotive safety devices. It was in this light that we established the requirement that the Federal employees use safety belts when operating or riding in Government vehicles and determined that our motor vehicle fleet should be made available to demonstrate the effectiveness of air cushion restraint systems and high visibility third brake lights. We are pleased to learn of your interest in these programs and to provide you with the additional information that you request. For ease of reference, your questions and our responses are incorporated in the enclosed fact sheet.

We would like to advise you of GSA's other safety initiatives. We intend to make suitable vehicles in our Fleet available to the National Highway Traffic Safety Administration or the manufacturing industry in order to field test non-lacerting windshields. In the near future, we will contact appropriate officials to inform them of our interest in this area.

In addition, GSA is also considering requiring that automobiles procured by our agency have heavy duty bumpers in lieu of those presently required by the Federal Motor Vehicle Safety Standard.

We assure you that GSA will closely monitor these safety programs and work closely with the automobile industry to be alert to new items which offer the potential for improving the safety of motor vehicles. If we can provide you with any further clarification of our safety programs, please contact us. We would welcome the opportunity to meet with you at a future date to discuss our policies in detail.

Sincerely,

L. L. MITCHELL,
Assistant Administrator.

Enclosure.

MOTOR VEHICLE SAFETY PROGRAMS

1(a). As part of your cooperative effort with the National Highway Traffic Safety Administration to install airbags in 5,000 GSA cars, have any particular goals been identified?

Yes. The goals of the NHTSA/GSA airbag program are to: (a) Document the fatality and injury reducing effectiveness of new generations of air cushion restraints; (b) provide additional exposure of this technology to the public to encourage acceptability of optional air cushion restraints in the marketplace; (c) demonstrate the operational characteristics (reliability, maintainability) of the systems themselves; (d) demonstrate that the industry can incorporate air cushion safety devices in vehicles without regulation; and (e) encourage private fleets to purchase driver air cushion restraint system equipped vehicles.

1(b). Do you anticipate any specific recommendations coming out of this program?

Our recommendations will be primarily dependent on the effectiveness of airbags as documented by the statistics arising out of our program.

2(a). In your testimony you note that GSA has installed high-mounted third brake lights on vehicles in the interagency motor vehicle fleet. How much does such a brake light cost?

We anticipate that the purchase cost will be about \$15 per unit.

2(b) Given their accident prevention record, do you believe that these lights should be installed on all cars sold in the United States?

GSA's decision to install the high-mounted third brake lights was based primarily on the accident prevention record established in two demonstration programs conducted by the Department of Transportation. The low cost of this safety device and its potential for protection against rear-end collisions, indicates that installation on a large-scale basis could be a prudent practice.

3. Do you have any statistics as to the effectiveness of the GSA order requiring seat belt use in Government cars? Have you seen any increase in belt use?

We do not have any figures as to seat belt usage prior to implementation of the GSA's order, but assume that usage was in line with that of the general public which is estimated at about 20 percent.

However, we believe that Federal employees are conscientious and as a rule make every effort to follow regulations. While it is difficult to make a judgment on the extent of seat belt usage, GSA's Fleet presently has an extremely low fatality record. We naturally assume that this record results in part from Federal employee use of seat belts.

Senator DANFORTH. We do hope to finish this up about 12 o'clock. Then some people have brought some cars for us to look at. We will see them at about 12 o'clock. So my hope is to take Mr. Bodack from Mercedes right now and then, when he finishes, to ask Mr. McCrae and Ms. Farthing if they would testify together and be questioned together.

STATEMENT OF WALTER R. F. BODACK, PRESIDENT, MERCEDES-BENZ OF NORTH AMERICA, INC.

ACCOMPANIED BY KARL-HEINZ FABER, VICE PRESIDENT, PRODUCT COMPLIANCE AND SERVICE ADMINISTRATION, AND PROF. WILLI REIDELBACH, DIRECTOR, PASSENGER CAR BODY BASIC RESEARCH, DAIMLER-BENZ A.G.

Mr. BODACK. Mr. Chairman, I am Walter Bodack, president of Mercedes-Benz of North America, a wholly owned subsidiary of Daimler-Benz A.G., Stuttgart, West Germany, manufacturer of Mercedes-Benz passenger cars, trucks, and buses.

With me today are Prof. Willi Reidelbach, who is in charge of research in the body engineering division of Daimler-Benz, and Karl-Heinz Faber, Mercedes-Benz of North America, Inc., vice president for Product Compliance and Service Administration. In addition, we have with us Mr. Jerome Sonosky, our Washington legal counsel.

Mr. Chairman, at Daimler-Benz safety and good engineering are synonymous. A well-designed vehicle is a safe vehicle. And, for decades, safety has been selling at Daimler-Benz. Not safety in some abstract sense, but real safety resulting from good engineering, tested design concepts, and a product that is durable and reliable.

Our announcement on January 28 that, effective in model year 1984, we will offer as an option on certain Mercedes-Benz automobiles sold in the United States a supplemental restraint system [SRS] is but another step in a long history of safety firsts which can be credited to Mercedes-Benz. With your permission, I will include in the record at this point a short history of Mercedes-Benz' safety development work.

[The material follows:]

THE HISTORY OF MERCEDES-BENZ SAFETY DEVELOPMENT

1931

Mercedes dual-joint swing axle improved comfort, roadholding and safety.

1931

Independent front suspension. By means of its own vertical movement, each wheel could follow the contours of uneven road surfaces.

1939 ONWARDS

First development of safety features in Mercedes-Benz test car II. Strong side protection, extremely rigid frame floor, three-section steering column. In 1953 these developments were incorporated into the Mercedes-Benz 180.

1949

Mercedes-Benz patent safety door lock. In an accident the conical safety locks do not burst open or jam.

1951

Mercedes-Benz develop the first safety body-shell in the world, later to go into standard production in the 180.

1959

First crash and roll-over tests. Greater knowledge can only be obtained by realistic testing. In one year 80 cars were written off in the exploration of safety problems.

1959

The first standard production cars in the world with an interior equipped to reduce injury hazards. Parts with which the occupants risk being brought into contact in a collision were designed with large, energy-absorbing surfaces or made to be flexible on impact: large, padded steering wheel boss, a padded, yielding dashboard, flexible control switches and levers, padded sun visors, window sills and arm rests, flexible window handles, recessed door handles, rear-view mirror detachable on impact.

1961

Front and rear servo-assisted disc brakes introduced. Greater traffic density calls for brakes which maintain high efficiency over a long period, drum brakes were no longer adequate. The problem was solved by using disc brakes, capable of withstanding higher temperatures. With servo-assisted brakes, less effort is required to depress the brake pedal.

1961

Anchor points for safety belts standard.

1963

Dual-circuit disc braking system front and rear for the entire car range.

1966

Mercedes-Benz contribute to co-ordinated safety research with the development of a systematic safety programme. For the first time all the essential aspects of safety are clearly defined and the terms "active safety" and "passive safety", now in general use, are coined.

1967

Mercedes-Benz safety steering assembly. The steering assembly yields progressively, thus avoiding the dangerous "spear" effect. The main features, a large padded steering wheel boss, impact absorber, telescopic steering column, steering box situated well behind the front axle.

1968

Mercedes-Benz safety head-restraints are introduced.

1970

Development of anti-lock braking system. The anti-lock braking system prevents the dangerous possibility of the wheels locking when the brakes are fully applied. The vehicle does not break away and can still be steered, so obstacles can still be negotiated.

1971

Belt-buckle anchored to seat frame.

1971-1974

Development of ESF 03, ESF 05, ESF 13, ESF 22 and ESF 24 experimental safety vehicles.

1973

Front-seatbelts and head restraints become standard.

1978

Pneumatic beam-height adjustment, with operation from the driver's seat.

1979

ABS introduced.

1979

Seatbelts standard on all seats.

1979/1980

Three-position anchorage adjustment for seatbelts in S-class.

1981

"Auto 2000" research car.

1981

Mercedes-Benz is the first manufacturer to offer its customers the additional safety features of the airbag and belt-tensioner.

Mr. BODACK. Briefly, let me describe the Mercedes-Benz supplemental restraint system. This is a system that is made up of an airbag plus knee bolster for the driver and an automatic emergency tensioning retractor for the front-seat passenger. The system functions as an adjunct to the driver's and front passenger's three-point seatbelt.

It is actuated following a frontal collision into a rigid barrier at a speed of 12 miles per hour or higher. The system is activated by an electronic crash sensor mounted on the car's transmission tunnel, which signals the airbag to inflate and simultaneously actuates the emergency tensioning retractor, tightening up the front seat passenger's seatbelt shoulder harness. The whole sequence takes less than 35 milliseconds.

As added system safeguards, there are a capacitor, which stores enough electrical energy to actuate the system if the battery is disabled in the first instant of the crash, and a converter which provides the required voltage should the car's battery be in a low state of charge.

The Mercedes-Benz supplemental restraint system [SRS] is an active restraint system. The emphasis should be put on three words, namely "supplemental", "restraint," and "action", the first

because we feel the airbag and belt tensioner are at best supplements to the basic restraints, and the key to general occupant protection lies in the word "restraint", that is to say in active belts, which have to be fastened by the person wearing them.

The ultimate purpose of the system is to reduce to a minimum the possibility of belted front seat occupants being injured as a result of impacting the steering wheel or the dashboard in the event of a frontal collision. This is not always possible with the use of three-point safety belts alone, nor is it intended that the driver rely only on the airbag to prevent injury.

The important point to recognize is that the system is considered a supplement to the existing safety features of the automobile, including the safety belts. To realize the full benefits of the system, front seat occupants must buckle their three-point safety belts.

This system is essentially the same one that we offer for sale in Europe, which was designed in consideration of the fact that there are mandatory seatbelt laws in practically every European country and, according to our latest count, in a total of 29 countries around the world.

The Supplemental Restraint System we have just announced for the United States follows suggestions made by former Secretary of Transportation William Coleman and NHTSA Administrator Raymond Peck, both of whom felt that advanced safety technology options should be available in the marketplace for persons wanting to avail themselves of these systems.

We have brought with us a short film that demonstrates the system in action, and with your permission I would like to show you the film at this time.

Senator DANFORTH. Good.

[Film shown.]

Mr. BODACK. We have also brought with us a demonstration vehicle which is equipped so that we can deploy the airbag and the tensioning device without an actual crash, and I would like to extend an invitation to you and the committee and its staff to see the vehicle.

Mr. Chairman, in your statement announcing these hearings you have asked for suggestions as to how Government and industry, working together, can help promote improved traffic safety.

As a vehicle manufacturer, we believe Government should expand and promote its present buckle-up campaign to increase safety-belt usage. We believe this campaign can serve to make the American public much more aware of the need to wear seatbelts. Even though our research shows that American Mercedes-Benz owners wear seatbelts at approximately five times the national average—53 percent compared to 11 percent—we will soon be including the same message in our advertising.

We also believe that a continuing and increased emphasis on the antidrunk driving movement in this country will make a major contribution to a lower death and injury rate. Although the problem of alcohol and driving has been with us ever since the first automobiles were built, the recent antidrunk driving grassroots campaign has stimulated nationwide attention and made the public focus on this issue. Support at all levels of government, industry,

and the general community is needed to combat this deadly cause of over half the Nation's traffic fatalities.

A worthwhile step that could help vehicle manufacturers whose business is spread across many international markets, and which could conceivably make it easier for American manufacturers to export to certain of these markets, would be harmonization of vehicle safety laws. Uniform international regulations would make it more economic for manufacturers to comply, and these savings could be passed along to customers. In addition, lead time to comply with new laws would be shortened, as only one solution to a new regulation would be necessary, rather than many solutions. For instance, we would suggest harmonization of United States and international lighting laws. At this time more liberal lighting laws are being considered by NHTSA, laws that are less design-restrictive and more performance-oriented. We support NHTSA's search for better nighttime forward visibility.

Tax incentives for increased levels of safety equipment are another possibility. These could take many forms, with perhaps the simplest of all being a tax deduction for those who purchase optional safety equipment such as airbags. Another possibility would be adoption of tax incentives for manufacturers who make optional safety equipment available.

Another form of incentives, could come from the insurance industry through reduced rates for individuals who purchase higher levels of safety equipment.

Finally, as we have expressed before, if mandatory seatbelt use could be enacted in the United States, serious injuries and loss of life would be reduced dramatically. Daimler-Benz has long been an advocate of mandating seatbelt usage as one of the most cost-effective methods of reducing death and injury on the highway.

Mr. Chairman, members of the committee, I thank you for giving us the opportunity to present our views on the important subject of these hearings. If you have any questions we will be pleased to answer them.

Senator DANFORTH. Thank you very much.

With respect to mandating seatbelt use, my own view is that there is a major difference between Government passing a law to mandate something and having people actually do it. I doubt that mandating that people wear seatbelts is going to result in people wearing seatbelts. It might have some effect.

Let me ask you this, sir. You have a seatbelt system and you have stated very clearly that it is very important and that people have to adjust their seatbelt, put their seatbelt on, and so on. If somebody is driving with a seatbelt, would the fact that he also has an airbag increase his safety in the event of a front-end collision?

Mr. BODACK. The potential is that it would certainly reduce the risk of facial injury and head injury, yes.

Senator DANFORTH. And supposing a person gets in a car and wrongly fails to buckle up his seatbelt. He just does not do it, for one reason or another, but has one of these airbags. Would the fact that you have an airbag and do not have your seatbelt buckled reduce the risks of injury over not buckling and not having an airbag?

Mr. BODACK. Depending on the type of impact, it could.

Senator DANFORTH. Why is this only on the driver's side rather than on the passenger's side as well?

Mr. BODACK. I think the important consideration here is the distance of the driver to the first possible object of impact, namely the steering wheel. That is not the case with the passenger.

Senator DANFORTH. What is the cost per vehicle of this?

Mr. BODACK. We estimate the cost in this limited usage to be between \$800 and \$900 per vehicle.

Senator DANFORTH. If it were on the whole fleet what would it be?

Mr. BODACK. I could not answer that question.

Senator DANFORTH. OK. Thank you very much, sir.

Are you going to advertise this availability? Will this be widely advertised?

Mr. BODACK. Yes, we certainly will advertise the availability of this option.

Senator DANFORTH. It will be part of your television advertising, do you think?

Mr. BODACK. Possibly.

Senator DANFORTH. To what extent do you believe that safety sells Mercedes?

Mr. BODACK. I think if you look at the long history of more than 50 years of our company's involvement in safety engineering, long before it became a public issue in the sense that it is today, I think our customers have long recognized the value of safety to their own lives, and as a consequence of that have bought the car.

Senator DANFORTH. Senator Riegle?

Senator RIEGLE. Thank you, Mr. Chairman.

My hunch is that the buyer of your cars is a special part of the market, defined partly by price, which is a higher price, and styling differences and so forth. And clearly, it is an extraordinary vehicle that you build in every respect.

Is there an extra charge for the supplemental system? Senator Danforth may have asked this.

Mr. BODACK. Yes. The additional charge will be between \$800 and \$900 per vehicle.

Senator RIEGLE. And what is the standard price of your vehicle that this will be added to? In other words, it is \$800 on top of what, as a rough sort of finished product price? I know it varies.

Mr. BODACK. Yes, it varies quite substantially, of course. We will introduce it in a new series, the 220 series that will be coming on the market with model year 1984. And the approximate price of that vehicle will be around \$25,000. We also will introduce it in the W126 or S-class series, the price of which ranges from \$35,000 onwards right to \$55,000.

Senator RIEGLE. So you are going to bring it in, though, to a car that retails at about \$25,000, and then you may have it available later on for cars that are in the \$35,000 to \$50,000 range?

Mr. BODACK. No. We are bringing it in simultaneously in both models.

Senator RIEGLE. I see. So you are bringing it into both of those lines.

Mr. BODACK. As an option.

Senator RIEGLE. I understand, as an option.

What do your initial forecasts lead you to think may be the percentage of people that would opt for this as an addition, say of those who will buy in the \$25,000 range?

Mr. BODACK. We have made some estimates, and they must be estimates, of course. We are estimating sales in the range of about 10 percent in each of those two models, which would amount to about 5,000 units in the first year.

Senator RIEGLE. I see. I appreciate your sharing that with us, and I know it is very hard to make those estimates. But one of the questions that arises sort of at the center of this debate is how much additional safety protection are people prepared to pay for. And you clearly have buyers for your cars who are of higher income levels generally, and so that the increment of an \$800 cost on a \$25,000 or \$35,000 or \$45,000 vehicle percentagewise is a good deal smaller than it is on a car that would be, say, at the \$8,000 range or the \$5,500 range or the \$10,000 range, which so many of the other cars in the country would be in those price ranges.

And it is interesting to me that the price elasticity, even for your buyer—your initial estimates are that you will get 1 in 10 of your buyers opting for this equipment, and therefore 9 in 10 opting not to take the equipment, at least in terms of your initial forecast. And we will see how it works out.

I applaud you for taking this step. I think that just watching your film and thinking about it, that this is a very sophisticated and I think a very positive initiative that you are taking here, and I hope that it will prove successful. I hope that it not only will prove its worth in terms of actual driving circumstances as you accumulate experience, but that maybe the prices can be reduced if the volume can be increased, and that maybe some measure of this can find its way into cars of probably lower price at some point.

I appreciate the sophistication of the work you are doing.

Senator DANFORTH. Thank you very much, sir.

[The attachments referred to follow:]

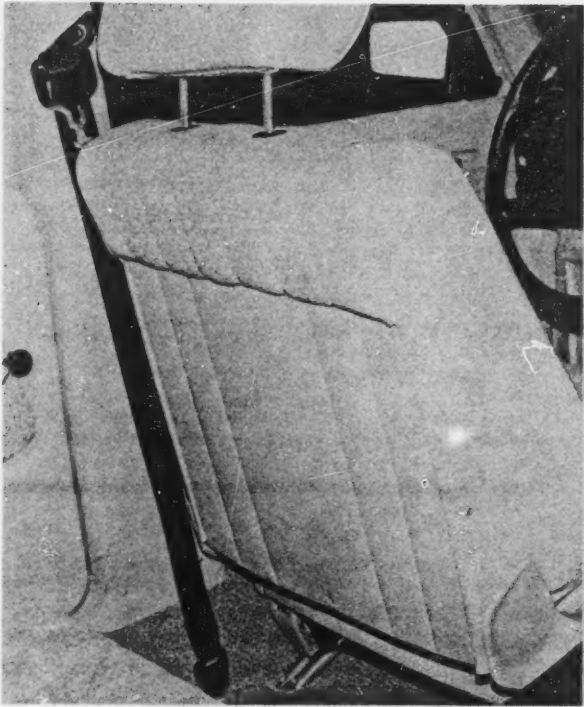


Fig. 1 - Integrated 3-point safety belt with ELR, Mercedes-Benz 280E

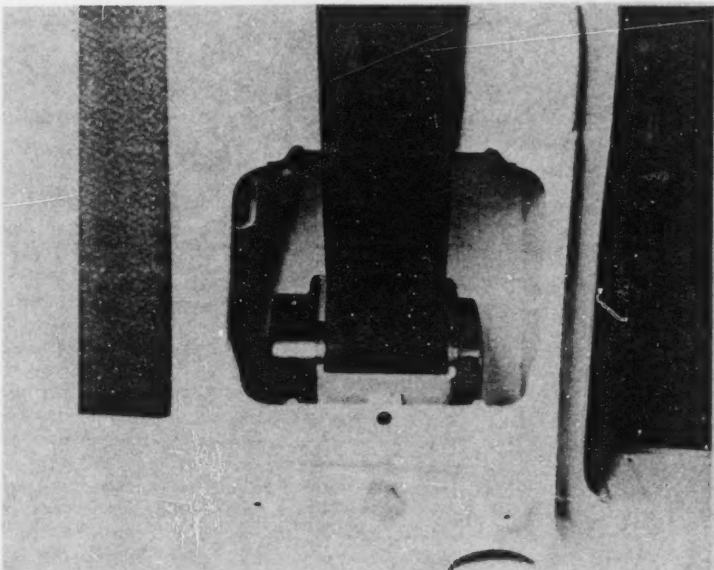


Fig. 2 - Belt retractor installation in B pillar

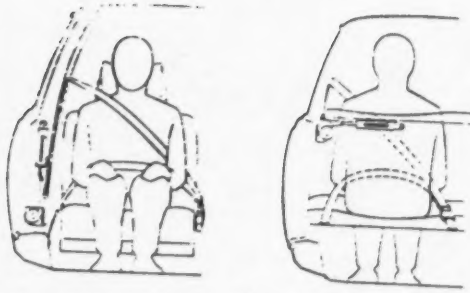


Fig. 3 - 3-point safety belt with longitudinal pretensioner, Mercedes-Benz ESW 22

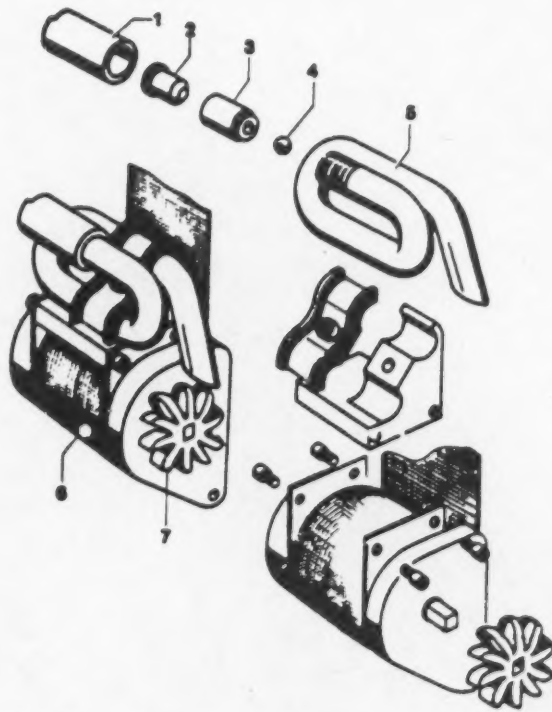


Fig. 4 - Pretensioner assembly added on a standard ELR, as installed in current European system

- 1 clamping nut
- 2 solid propellant capsule
- 3 gas generator housing
- 4 flying piston
- 5 fluid filled tube
- 6 emergency locking retractor
- 7 turbine wheel

BEST AVAILABLE COPY

50 km/h Frontal Fixed Barrier Impact

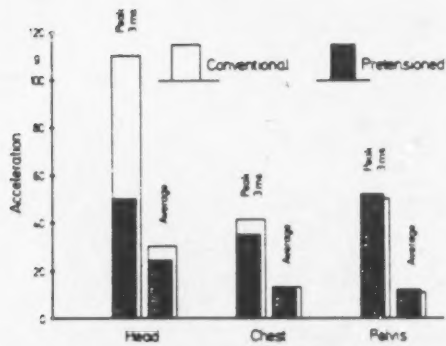


Fig. 5 - Accelerations of dummies restrained by conventional and pretensioned 3-point belts

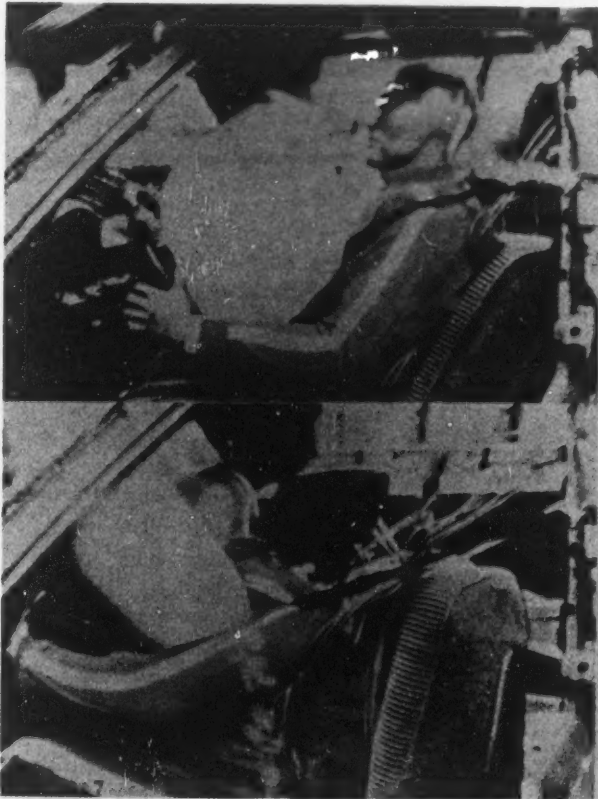


Fig. 6 - 3-point belt with ELR and steering wheel air bag

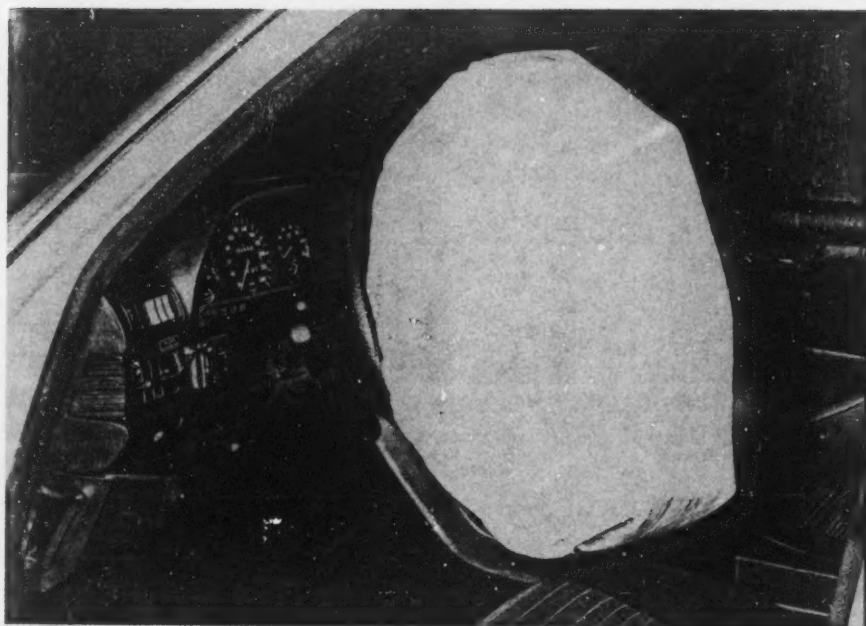


Fig. 7 - Driver air bag



Fig. 8 - Kneebolster, part of Mercedes-Benz supplemental restraint system

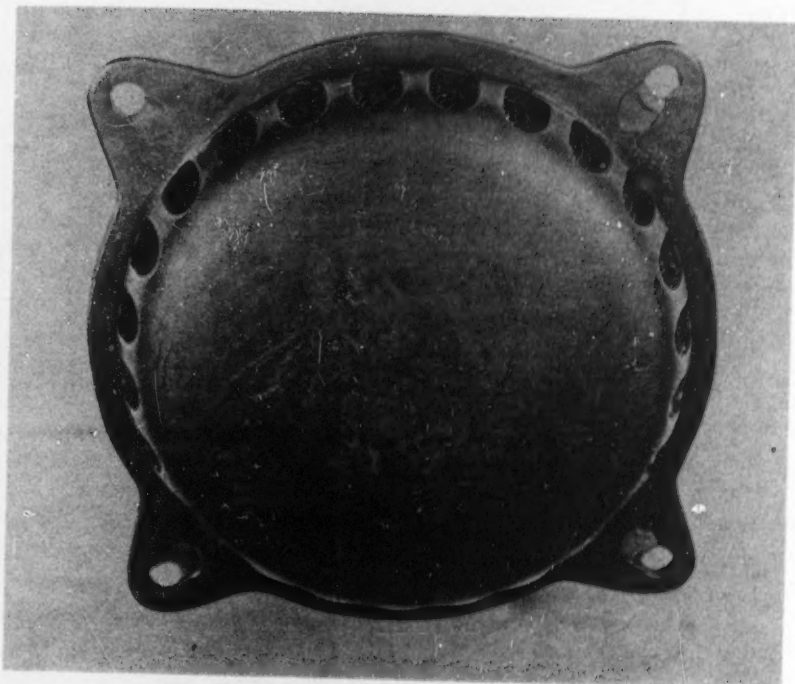


Fig. 9 - Solid-propellant gas generator

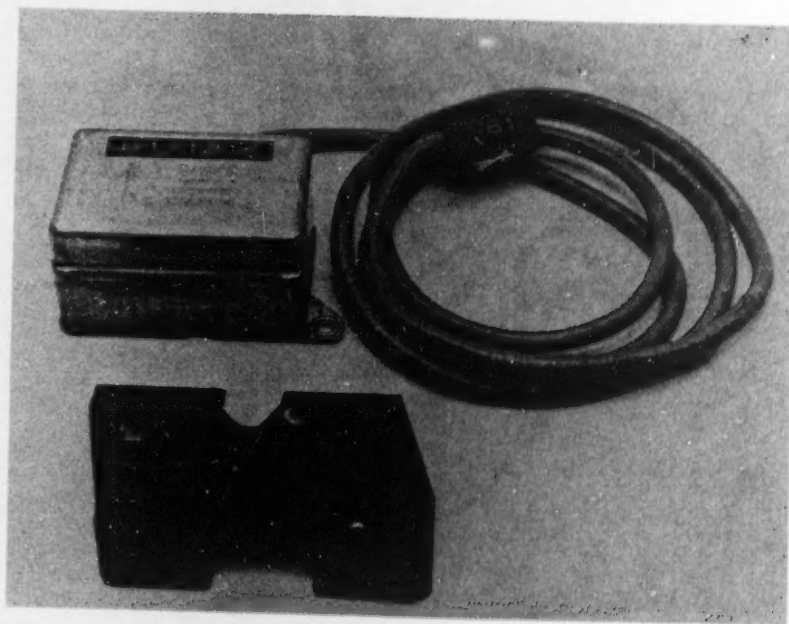


Fig. 10 - Electronic sensor

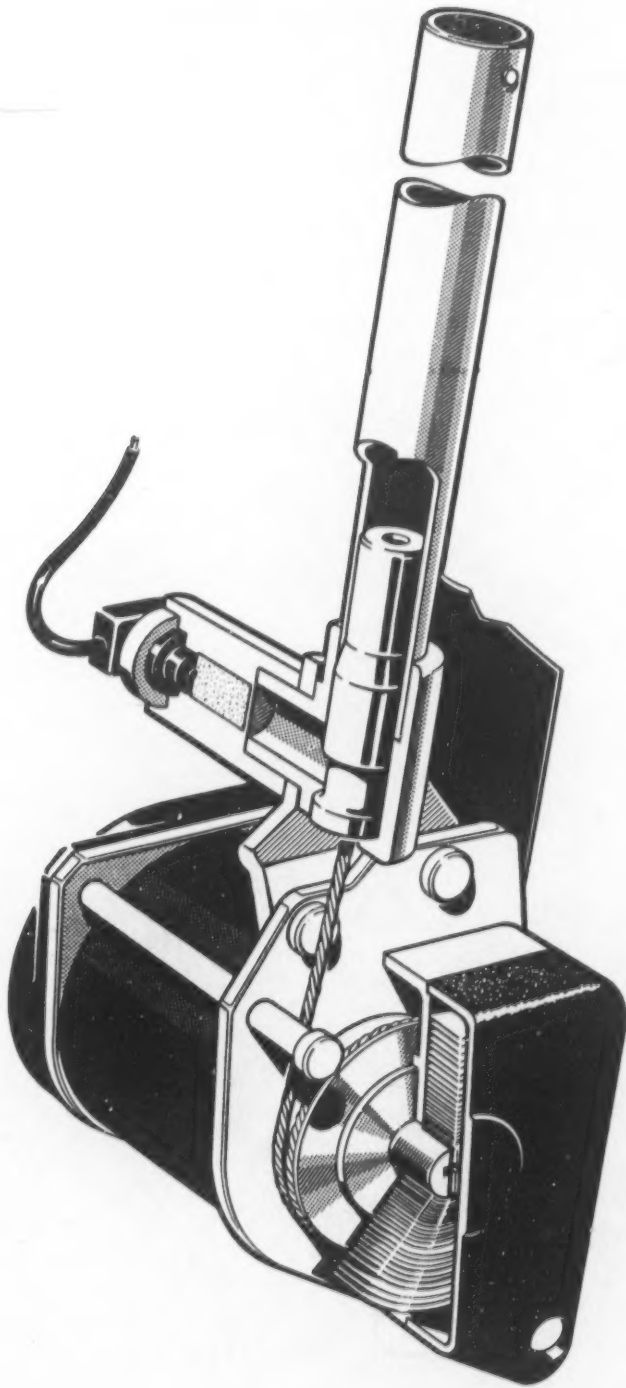


Fig. 11 - New design emergency tensioning retractor, to be used in SRS

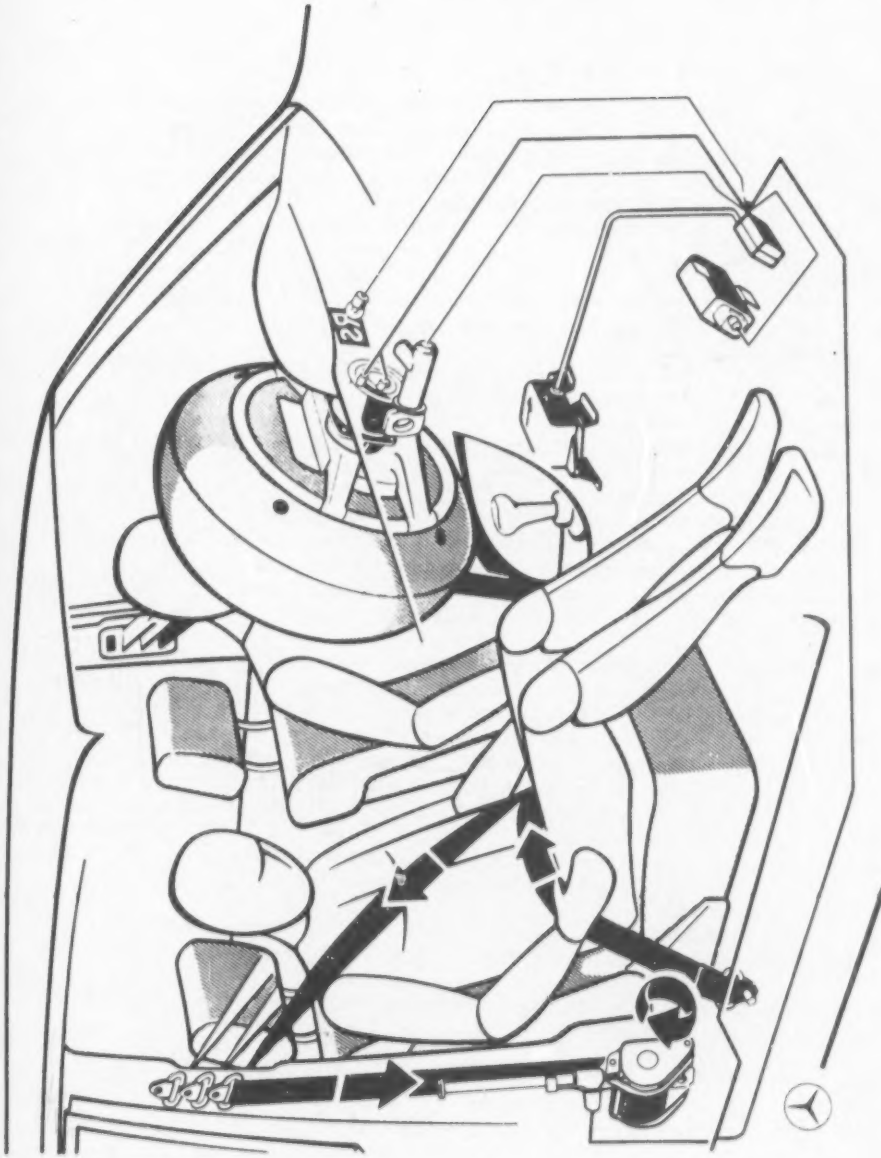


Fig. 12 - Schematic of supplemental restraint system

[The following information was subsequently received for the record:]

QUESTIONS OF THE COMMITTEE AND THE ANSWERS THERETO

Question. Are there any additional safety features you would consider to be beneficial to install on new cars in the near future? If so, what type of features?

Answer. As a general response, I would like to reemphasize the need for international harmonization of vehicle safety laws which would help assure the timely introduction of some of the latest safety technology into the U.S. market.

Specific features not now offered here that would have a safety benefit include the European-type lighting systems. Not only do these provide much greater nighttime visibility, but they allow use of our headlamp washer/wiper system, and our vertical beam alignment system to compensate for heavy loads in the trunk or the weight of a trailer. Both of these features have long been part of the Mercedes-Benz headlamp system sold in Europe.

Additionally, the European headlamp system allows for full integration into the flow of the vehicle's body design, thus creating the potential for increased fuel economy through improved aerodynamics.

We are also studying the feasibility of offering the second generation version of our ABS anti-lock brake system in some of our North American models. This system, currently offered as an option in Europe, automatically modulates braking force at the front and rear wheels to compensate for differing co-efficients of road surface friction, thus preventing wheel lock-up so that the vehicle's steering control is not adversely affected, even under maximum emergency braking conditions.

Question. Other automobile manufacturers have claimed that the public will not accept air bags. Why does Mercedes-Benz believe air bags will sell in the United States?

Answer. It should be made clear that what we are offering as an option on certain of our vehicles is the Mercedes-Benz Supplemental Restraint System, which consists of an active three-point seat belt supplemented by an air bag and a knee bolster on the driver's side, and an Emergency Tensioning Retractor on the passenger's side.

Following both the technical and marketing success of the system in Europe, we decided to offer it here also as an option on a limited basis to test market acceptance on two model lines. We are hoping that initially at least 5,000 customers will purchase the system, which will lead to the second phase in MY 1985 in which the SRS will be offered on a third model line. Depending on customer response at that point, extending availability of the option across the balance of the model line in MY 1986 is contemplated.

Because of the expressed high interest in safety by our owners and their high usage of seat belts, we are hopeful of success. The marketplace, of course, will be the final judge.

Again, thank you for the opportunity to share our views on safety in the marketplace with you and your colleagues.

Senator DANFORTH. I want to first express my appreciation to Mr. Mitchell for his willingness to submit his testimony. We are just not going to be able to get to Mr. McCrae or Ms. Farthing today, I am sorry to say. I appreciate their patience for being here, and our staff will be in touch with them and try to find out some way for them to present their information to us.

Now, are these cars all located in one place? Who knows where they are?

VOICE. They are on Delaware Avenue.

Senator DANFORTH. OK. We are about to go see some cars.

[Whereupon, at 12 noon, the subcommittee was adjourned.]

ADDITIONAL ARTICLES, LETTERS, AND STATEMENTS

STATEMENT OF PENELOPE S. FARTHING ON BEHALF OF THE AMERICAN INSURANCE ASSOCIATION

I am pleased to appear today in response to your invitation to discuss how the government, automakers and insurance companies can work to make improved safety options available to the public.

The American Insurance Association (AIA) is a trade association of 168 stock and mutual insurers. We are the oldest association in the American insurance industry and one of the oldest trade associations in the country. In 1981, AIA companies wrote \$5.3 billion in private passenger auto premium, or about 15 percent of all such insurance underwritten in the United States. Dating from the creation of the National Board of Fire Underwriters in 1866, one of our predecessor organizations, the companies which comprise our membership have been safety pioneers.

First of all, I wish to commend the Subcommittee and particularly Chairman Danforth for focusing the attention of Congress, the media and the public on these life and death matters. We understand the enormous time pressures under which you must operate and we are grateful that you have properly assessed the need for special intense scrutiny of these highway safety issues.

Fifty thousand eight hundred (50,800) persons died on highways last year and 1.9 million people suffered disabling injuries.¹ The bill for this carnage and the associated property damage totaled \$40.6 billion. We at the American Insurance Association believe that the statutory framework is in place at the federal level to substantially reduce the shocking number of deaths and injuries attributed to motor accidents. We do have a concern that the National Highway Traffic Safety Administration (NHTSA) has not been especially vigorous in carrying out its mandate.

The Subcommittee indicates a special interest in areas where insurance companies have performed in a technology forcing capacity. The AIA has been a consistent proponent of FMVSS 208, the passive restraint standard. A number of our member companies, many of whom use rates based on data prepared by the Insurance Services Office, offer premium discounts of about 30 percent on the medical payments portion of the auto insurance policy in "fault" states and a similar discount on personal injury protection (PIP) coverage in "no-fault" states to policyholders who own passive restraint-equipped cars. We believe this should serve as an incentive to our policyholders to shop for vehicles equipped with passive restraints which have proved themselves to be safer in crashes.

Regrettably, the Association has had to resort to litigation because the Department of Transportation has, after nearly 12 years of exhaustive legislative, judicial and administrative activity, revoked the passive restraint standard FMVSS 208. As a result, we appear as an *amicus curiae* in the United States Supreme Court in the lawsuit initiated by State Farm seeking to reinstate the standard. I attach for your information a copy of our brief and ask you to incorporate it in this hearing record. In our analysis, we and others in the industry were acting to encourage safety by offering lower premiums for passive restraint equipped vehicles. The Department, by its revocation of FMVSS 208, has essentially thwarted our efforts. We are optimistic of our chances for ultimate success in the Supreme Court. We believe the air bag has unique capabilities as a lifesaving and injury preventing device and we look forward to the time when this technology is widely available.

Similarly, our Association supports the concept of better bumpers and has been a consistent advocate of the 5mph no damage bumper. Once again, some AIA companies offered a discount in collision coverage for vehicles equipped with these devices and once again NHTSA has rolled back the standard. Consequently, we find ourselves once more in litigation—in this instance in the Court of Appeals for the District of Columbia as an *amicus curiae* in a lawsuit growing out of NHTSA's backtracking on the better bumper issue. I should also like our brief in that case to be made a part of the record.

¹ "Accident Facts," 1982, National Safety Council, p. 40.

The Association is a strong proponent of state laws requiring the use of approved child restraints. To date, 23 laws have been enacted and two more only await the governor's signature. Elsewhere, similar child restraint laws are in various stages of development in other legislatures. While our activities in support of these restraints may not fit a narrow definition of "technology forcing," we believe you will agree that our industry's missionary work has speeded up the public acceptance of the lifesaving capabilities of these devices.

A number of companies belonging to the American Insurance Association engage in what we call "make and model rating," a technique by which underwriters calculate the physical damage portion of the premium in part by evaluating the damageability and repairability of the vehicle. This enables our companies to give policyholders who select safer and more damage resistant cars which may be repaired with relative ease the benefit of a somewhat lower premium. The 5mph bumper is an example of the sort of technology which would result in insurance savings for consumers in the make and model rating program. Similarly, the make and model rating program reflects which cars are most frequently stolen and enables us to base comprehensive coverage rates, in part, on a vehicle's theft resistance. This is, we submit, a good example of how the insurance mechanism can foster the development of improved safety technology.

One of the most beneficial undertakings of a technical nature in which AIA participates is our joint sponsorship with others in the auto insurance industry of the Insurance Institute for Highway Safety (IIHS). The Institute is one of the premier safety research bodies in the U.S. and has developed a well-earned, worldwide reputation for its work in this field. We assisted in the creation of the Institute in 1959 and we take great pride in its accomplishments. We know this Subcommittee is familiar with the integrity and professionalism of the Institute and its staff. Many of the safety ideas which the insurance industry has been credited with developing and promulgating have oftentimes been inspired by IIHS research work. The American Insurance Association would like to publicly thank the Institute for its matchless contributions to the cause of highway safety.

The Association has for several years been conducting a vigorous advertising campaign to alert the public to those things that effect the cost of insurance, including new developments in traffic safety. These large full-page advertisements appear in wide circulation periodicals such as Time and Newsweek. I have brought along samples of these ads to share with your Subcommittee and hope you will incorporate these into the record.

Finally, our association is appreciative of the opportunity your Subcommittee has afforded us to discuss our experiences in making better highway safety technology available to consumers. AIA applauds your interest in this vital topic and pledges our continuing support for this lifesaving mission.

AMERICAN INSURANCE ASSOCIATION,
Washington, D.C., April 6, 1983.

Hon. JOHN C. DANFORTH,

Chairman, Senate Surface Transportation Subcommittee, Committee on Commerce, Science and Transportation, Russell Senate Office Building, Washington, D.C.

DEAR CHAIRMAN DANFORTH: This is in response to your recent letter in which you raised several questions following the statement I submitted for the record of your March 11 hearing.

You inquire what activities, other than discount programs, our industry has promoted in order to foster auto safety. Our companies have participated with the auto industry in designing new cars in order that safety may be built into the car. When the auto makers take the steps that we believe will insure greater auto safety, these cars are considered more desirable insurance risks and their rates are so adjusted. We have also engaged in several advertising campaigns to increase public awareness about auto safety. I made copies of some of these ads available at the hearing, and I would be interested in pursuing these at greater length with your staff. The Association is also a founding member of the Insurance Institute for Highway Safety, one of the world's most noted highway safety research bodies.

Secondly, you asked whether we believe auto safety can sell. We are of the opinion that it can sell, and there have been a number of opinion polls that indicate that the public is, indeed, interested in acquiring safer automobiles. I would be happy to share these with your staff, if you wish. We believe our advertising campaign is helpful to make the public more aware of the need for improved highway safety. In this regard, the advertisement that I attached to my statement about highway safety hazards is a good example. In order to make the public want to buy

improved auto safety technology, we think they must first be aware that it is available, and our advertising campaign is helpful to this idea.

You also inquire whether vehicle occupants must wear their seatbelts in order for airbags to be effective. I was distressed upon hearing one of the witnesses from the auto industry testify that seatbelts are required to protect front seat passengers in collisions even though airbags have been built into the car. I am confident that my reading of Federal Motor Vehicle Safety Standard 208 is an accurate one; that standard would require passive protection to prevent injuries to front seat occupants in a 30 MPH front end/front angular collision. This means, incontrovertibly, that seatbelts are not necessary to protect motorists from injury in that kind of collision. Consequently, the auto witness whom we heard testify on March 11 misconstrued the standard.

Your final question is why we believe FMVSS 208 would be effective when NHTSA apparently believes that it would not be. We have arrived at our opinion about the effectiveness of FMVSS 208 in part because of DOT tests that were conducted of the airbag early on in its development. Later tests conducted by the Insurance Institute for Highway Safety, and by at least one private insurance company, demonstrated the lifesaving and injury preventing capabilities of these devices. In all of these instances, the airbag proved itself to be at least as protective and, in most instances, even more protective than a three point belt. I have no way of knowing why NHTSA might believe that the passive restraint standard would not afford the kind of protection we believe it would. I can only speculate that it might have to do with the cost/benefit equation. While we believe the airbag would cost in the neighborhood of \$200, depending on the number of airbag cars produced, NHTSA has suggested, based on various representations from the auto makers, that these costs could be many times higher. This possible explanation goes to the economics of the airbag. I am simply unable to guess why the NHTSA is not convinced about the airbag's effectiveness.

I hope these answers are responsive to your inquiries. We look forward to continuing our work with you in the vital area of auto safety. With thanks and best personal regards.

Sincerely yours,

PENELOPE S. FARTHING,
Senior Counsel.

STATEMENT OF ROBERT F. McDERMOTT, CHAIRMAN AND CHIEF EXECUTIVE OFFICER, UNITED SERVICES AUTOMOBILE ASSOCIATION [USAA], REPRESENTING THE NATIONAL ASSOCIATION OF INDEPENDENT INSURERS

Mr. Chairman, Members of the Subcommittee, I am Robert F. McDermott, Chairman and Chief Executive Officer of USAA, headquartered in San Antonio, Texas, and Vice Chairman of the National Association of Independent Insurers.

I am here for two reasons. First, to support your bill, S. 477, which proposes a tax credit for auto manufacturers installing air bags in new cars. Second, I am here to discuss generally the matter of expediting the introduction of modern occupant crash protection technology into the marketplace to reduce the carnage on our highways.

NAII is the nation's largest property/casualty insurance association with more than 500 companies which write nearly half of the automobile insurance in the United States. My company, USAA, is the seventh-largest auto insurer.

On behalf of NAI, I appreciate the opportunity to appear before you today as we did last year to discuss this issue, and I would like to commend you, Mr. Chairman, for your courageous leadership in the area of auto safety. You deserve the praise not only of those of us in the insurance industry but of the American public as well.

I would like to frame my remarks in the context of what has happened within the last year. There has been some good news, but, I regret to say, there has been bad news as well.

Let me start with the positive side. The National Highway Traffic Safety Administration says that recent fatality estimates for 1982 show that the fatality rate declined from about 50,000 to 45,000. However, we do not know why this drop occurred and further study is needed. There appears to be a correlation historically between such declines and hard economic times. But the definitive answer will await more extensive analysis.

Public interest in auto safety has been considerable and came from quite a variety of sources. This was exhibited by hearings conducted in Congress, notably of this Subcommittee and the Subcommittee chaired by Congressman Wirth in the House;

the efforts of NAAH and public interest groups such as MADD, Mothers Against Drunk Drivers, and others to curb drunk driving; the Administration's "Buckle Up" campaign; and USAA's own national initiative a little more than a year ago, which identified the relative safety of specific makes and models of cars. You might remember our report announcing that small American cars are generally safer than small foreign cars.

That public interest has sparked a response:

Mercedes-Benz announced it will offer the air bag in a driver's side version, really a face bag to be used in conjunction with a three-point seat belt. It will become available in the top of the line models initially. Although a limited air bag, so to speak, it has been produced in Europe in more than 12,000 cars to date. Unofficial information I have received indicates that at least 31 accidents involving air bag-equipped Mercedes have occurred and that only eight minor injuries were recorded, including those of passengers who had not used their seat belts. The data tell me that even the smallest version of the air bag works.

BMW and Volkswagen reportedly are considering offering air bags.

Honda displayed an air bag-equipped prototype at an international auto show in Japan last year, a sign that the Japanese may be on the verge of joining the Europeans in offering the air bag before too long.

Even General Motors has now recognized the mounting public interest in auto safety. Its recent advertising has cited the comparative data released by USAA which showed GM's cars had a better safety rating than their Japanese competitors. Its television ads of late have begun showing crash dummies in test situations, obviously demonstrating GM's new conviction that safety does sell.

It now appears that the new non-lacerating windshield developed in France will be making its long-awaited debut in the U.S. According to a GM press release, the company plans to install them on a small test basis in a group of rental cars. Perhaps even this small test will convince the auto industry that hundreds of thousands of facial injuries and disfigurements can be prevented by widespread use of this new windshield.

Finally, the General Services Administration announced a demonstration program using a small number of air bag-equipped cars for testing, and even NHTSA is beginning to move forward with a program to retrofit a number of state police cars with air bags, again for test purposes.

Unfortunately, the bad news in 1982 more than outweighed the good news.

As all of us in this room know too well, NHTSA decided to fight the U.S. Appeals Court ruling overturning its rescission of the passive restraint rule. The question is now before the Supreme Court. Even if the outcome supports the lower court's ruling, more time will have been lost and with it thousands of lives.

NHTSA also dropped the bumper standard back from 5 to 2.5 miles per hour. Your hearing in February, the first of this series, amply demonstrates the folly of that decision.

And still NHTSA has continued to demonstrate its reluctance to advance the cause of auto safety in any significant or realistic way. I mean to cast no aspersions on the action taken by GSA in its demonstration program nor on the NHTSA state police program. On their own, they are fine. But they fail to address the major problem of safety for the driving public at large.

More discouraging was the fact that on one—not you nor I nor anyone else in the American driving public—could purchase a car with an air bag. That option was not available at all, period.

Of course, the most tragic piece of bad news is that auto fatalities continued to be the second-largest cause of death in the United States—second only to cancer. Yes, we had a reduction in the fatality rate which had been averaging more than 50,000 per year for several years. But the grim fact is that 45,000 Americans died in their cars and probably another 3.5 million were injured. And, the dollar cost associated with these tragedies has been estimated to be as high as \$50 billion annually.

Thus, 1982 must be viewed and can only be viewed as another year of failure. Lowering the number of deaths to "only" 45,000 still means that some 123 persons died each day last year on our streets and highways. Our statement of last year has become a cliché by now, but the fact remains that if we had an airline crash taking 123 lives, there would be an immediate national uproar. If we had two in a row, the matter would come up as a question at the next Presidential press conference. And, if we had three in one week or one month, the airlines would be under the most severe federal and media scrutiny imaginable.

But 123 still die each day with barely a ripple of reaction except when one of our own family members or friends become a statistic. Ironically, we have the means at hand to reduce that toll substantially yet we do not apply it.

Despite the reduction seen in 1982, we expect this unacceptable level of death, injury and economic loss to continue and perhaps become worse, if the public is not offered the option of an automatic passive restraint represented by the air bag.

As the number of small cars increases, the number of deaths and injuries will rise. And, as the price of oil and gas declines, driving likely will increase, thus broadening the risk of exposure.

Unfortunately, the manual seat belts currently installed in all cars, which are an incomplete answer to the problem, are not even being used by automobile occupants. Despite enormous efforts to "buckle-up," the public is simply not doing so in meaningful numbers. Moreover these seat belts are not dynamically crash tested and, in some instances, they have been subject to recall campaigns.

What is needed is a passive, automatic—repeat, passive, automatic—system that is in the car and functions at the moment it is needed. The best device for this purpose is the air bag, a technological advancement which has been available for a decade. If the air bag were in common use, estimates show it could save 9,000 to 10,000 lives annually and thousands of injuries.

NAII is deeply concerned about the failure of the marketplace, thus far, to offer cars with the latest technological advances in occupant protection, particularly the air bag. Whether the industry will be required to offer some form of automatic occupant crash protection (air bags or automatic seat belts) by federal mandate remains to be decided by the Supreme Court.

Regardless of how the high tribunal rules, the air bag tax credit bill you have introduced, Mr. Chairman—S. 477—represents an excellent approach to the issue. If the Supreme Court affirms the Appeals Court decision, automakers would be required merely to provide some form of automatic occupant protection. Car makers earlier had indicated that they intended to comply by providing automatic belts rather than air bags.

Your bill, on the other hand, would offer manufacturers a clear economic incentive to provide the air bag protection which would give occupants far superior protection in most car crashes.

As one who works in one of the nation's most regulated industries—insurance—I am not an advocate of additional government regulation of business. But in my view, the free enterprise system has failed to function effectively in this case because the automakers have refused to make available to the driving public a tested, proven and affordable system—the air bag.

You could hear a good testimonial of the air bag's effectiveness from the Ford engineer who walked away from a crash in which he rear-ended another car at high speed while driving a special Lincoln company car equipped with an air bag.

Yet the industry resolutely fights the air bag—even as an option. The central feature of a free market economy is choice. Perhaps our American manufacturers would offer us that choice if Honda, for example, were to make the air bag standard equipment in its products.

The insurance industry has tried for years to overcome this automobile industry inertia. Many insurers have offered and continue to offer discounts on the personal injury portion of the insurance premiums for cars equipped with automatic crash protection such as air bags.

We have talked with auto industry leaders in an effort to encourage the voluntary use of such systems as either standard or optional equipment.

We have participated for a dozen years in the federal regulatory proceedings seeking to implement the National Highway Traffic and Motor Vehicle Safety Act by mandating automatic crash protection systems.

USAA joined with the Insurance Institute for Highway Safety in publicizing the safety comparisons of different model cars through national press conferences, full-page ads in the Wall Street Journal and policy-holder bulletins.

But until the recent Mercedes-Benz and BMW announcements, our efforts to get air bag technology into the marketplace have been fruitless—and thousands of additional lives have been snuffed out as a result. Yet we know, and the manufacturers know, that the public wants safer cars. Public opinion polls over the years and the response to our own ad campaign have validated this fact. GM's own studies in 1971, '75, '78 and '79 all showed strong consumer demand for air bags.

Auto safety experts are now convinced that we have done about as much as we can do in terms of changing driver behavior and habits. We will never be able to get all of the drunk drivers off the road or get all the drivers and passengers to use manual seat belts each and every time they enter a car. What is needed, and what Congress directed NHTSA to do in 1966 when it passed the National Traffic and Motor Vehicle Safety Act, is to make cars safer so that a crash, for whatever reason,

does not needlessly kill or injure the driver and passengers. The technology exists to do this, but still remains on the shelf.

It will come eventually—of that I am confident. But until air bags are widely available, the auto industry will carry a weighty moral burden. To put it simply and bluntly, the auto makers have no moral right to withhold equipment that we all know would significantly reduce the number of men, women and children killed and injured on the highways.

In closing, let me note that you requested recommendations for other technological improvements to advance auto safety. However, NAIH has chosen to concentrate on the air bag because we are firmly convinced that it is the single most important piece of equipment which has been tested and proven reliable.

We urge that the many other advances that can be incorporated easily into auto design be adopted by the manufacturers. But the air bag rates the first priority and for that reason we support S. 477, your tax credit bill, as a means for achieving this objective.

I thank you for this opportunity to appear before the Subcommittee, Mr. Chairman.

QUESTIONS OF THE MAJORITY AND THE ANSWERS THERETO

Question. Fatality estimates for automobile accidents show a decline in 1982. To what do you attribute this decrease?

Answer. We do not know what caused the decline in fatalities in 1982. The indicators are currently being studied by highway safety experts. But, there appears to be a correlation historically between such declines and hard economic times.

Question. What is your opinion of mandatory seat belt laws? Do you believe such a law would be effective in the U.S.?

Answer. We do not believe a mandatory requirement that auto occupants buckle-up their seat belts would be effective in this country. The major problem is enforcement. If nearly 90 percent of the American public currently refuses to protect life and limb by using such manual belts, it is difficult to believe that a law requiring them to do so would be complied with in meaningful numbers.

The difficulty of mandating seat belts usage was clearly illustrated in the testimony of Mr. R. V. Durham, Director, Safety and Health Department, International Brotherhood of Teamsters. Mr. Durham reported that a survey of the union's membership determined that only 6% of these professional union drivers who spend all their working hours on the road used their seat belts. I would note further that these drivers are required by federal regulation to wear the belts. If people who earn their livings behind the wheel and are required to wear the belts do not do so, the general driving public cannot be expected to do significantly better. The only way to assure such compliance would be to have a law enforcement official in each car at all times to make certain everyone complied each and every time they entered the car. This is an unrealistic approach to the problem. Passive or automatic occupant protection is the answer.

The history of public health tells us that prevention built into the system generally works better than millions of individual preventive acts. Thus, purification of water in the distribution system is much more effective in promoting public health than requiring each American to boil his or her water before consumption. Pasteurization of milk is more effective in reducing bovine tuberculosis and undulant fever than requiring each person to boil milk before drinking it. Likewise, passive restraints built into the automobile will certainly be more effective and, I might add, intrude less on individual freedom of action, than mandatory seat belt laws that require millions of individual decisions and actions of buckling and unbuckling each day and constant police surveillance to enforce the law.

Question. What is your opinion of NHTSA's "buckle-up" campaign? Do you believe this type of promotional effort is an effective means of promoting seat belt use? Would you recommend any alternative approach?

Answer. We support any efforts to reduce motor vehicle deaths and injuries. However, I believe "buckle-up" campaigns are a largely ineffective and wasteful method to achieve that end. Past efforts in this country to increase seat belt usage through buckle-up campaigns have had no lasting effect and relatively little short-term effect except in highly specialized circumstances which cannot practicably be repeated in a large group much less country-wide. In short unless there is some new departure in human motivation techniques, NHTSA's buckle-up campaign will have little effect in increasing seat belt usage and will squander money and effort.

But even if the NHTSA program should succeed it will only increase belt usage to 25 percent according to NHTSA's own most optimistic goal.

The most disturbing aspect of NHTSA's buckle-up campaign is not the campaign itself, but the fact that the campaign is a substitute for the passive restraint standard. The sum of NHTSA's action is that it discarded an approach that would provide everyone automatic crash protection while instituting an approach that at best will work for only 25 percent of the motoring public.

Question. We heard testimony from some witnesses that vehicle occupants must wear their seat belts in order for air bags to be effective. What is your opinion of this claim?

Answer. The claim is in error. Air bag systems that comply with NHTSA's automatic crash protection standard before it was rescinded are designed to protect with and without the use of seat belts. In fact, the standard required that compliance tests be conducted without the test dummy being belted. In frontal and front angle crashes, the category of crashes in which about 50 percent of the passenger car occupant deaths occur, air bags alone are extremely effective and generally conceded to be more effective than lap/shoulder belts when worn.

By NHTSA's own estimates, taking account all categories of crashes, the air bag system is highly effective and is the most effective of all systems if the lap belt is worn. If installed in all cars air bags would provide vastly increased protection for the vast majority of occupants who will not wear belts. Those occupants wearing lap belts will receive somewhat more protection than current lap/shoulder belts offer.

The Mercedes-Benz air bag system does not attempt to comply with the rescinded passive restraint standard. It is a driver side only system and is designed to supplement a three-point manual belt.

Question. Many insurers have offered premium reductions for cars equipped with automatic crash protection such as air bags. How aggressive have insurers been in making this policy known? Is there more, in your opinion, that the insurance industry could do to promote auto safety, either through premium reductions or other means?

Answer. Insurers have publicly announced the availability of premium reductions for cars equipped with automatic crash protection systems such as air bags to the auto manufacturers, insurance regulators, and Congress, as well as to the public at large through the news media, policyholder communications and sales agents. The most important audience, of course, is the auto industry, but the evidence to date suggests that such discounts have not prompted positive action.

The only other viable mechanism insurers have to promote auto safety is through public advertising or policholder announcements. USAA's successful effort of last year probably can and will be repeated by insurers in the years ahead. Such efforts are, however, extremely costly and are no substitute for action by the auto manufacturers themselves to make cars safer.

Question. We have heard testimony asserting that the public wants safe cars. Yet the auto industry claims that consumers generally are not willing to pay for this technology when they purchase a car. How big a problem do you believe this to be and what do you think can be done to remedy this situation?

Answer. Frankly, I have never understood the auto manufacturer contention that the public is generally not willing to pay for safer cars when all the evidence points to the opposite conclusion. When Ford offered manual belts as an option in 1956 they sold faster than the company could install them. When Mercedes-Benz offered a driver side only air bag in Europe that required the use of a three-point manual belt, it sold well despite a relatively high price. Numerous consumer polls, including one in-depth analysis conducted for General Motors, show strong consumer support for auto safety technology and a willingness to pay for it. Interestingly, as documented in the Wall Street Journal, General Motors failure to sell more than 10,000 air bag equipped automobiles in 1974-1976 resulted from GM's resistance to marketing them. I don't believe GM's experience can be cited to show consumer resistance.

In the case of air bags, which are both reliable and cost beneficial, if the auto manufacturers believe the cost to be too great for the market to bear, they should welcome your tax credit bill which gives them an economic incentive to provide this equipment.

STATEMENT OF ROMEO KOJYO CO., INC.—AN ALTERNATE PERSPECTIVE OF THE AIRBAG

(By David J. Romeo)

Romeo Kojyo is a new company located in Tempe, Arizona and is affiliated with Takata Kojyo Co., Inc. of Tokyo, Japan.

Romeo Kojiyo was formed specifically for the purpose of helping to provide airbag components at reasonable prices to automobile manufacturers who have a serious commitment toward improving the crash survivability of the vehicles they produce.

Regardless of whether or not federally mandated, regardless of how evident in dummy crash test results, regardless of whether or not a belt restraint system is used, the airbag significantly increases the crashworthiness of an automobile.

In this presentation the basic concept of crashworthiness or crash survivability and injury reduction as a function of crash severity will be introduced and the role of the airbag, the seat belt and vehicle size will be discussed.

The first figure illustrates a concept which is generally well understood; that being the increase in injury severity with an increase in crash severity for a given vehicle, say for example a 4,000 pound automobile.

For illustration, hypothetical but not unrealistic quantitative values have been applied to the co-ordinates using abbreviated injury scale, AIS and crash velocity.

A second curve can then be added for a downsized or smaller vehicle, say one of 2,800 pounds. The illustrated increase in injury severity with a decrease in car size is also self recognized.

A third curve can then be added which represents the 2,800 pound car when equipped with an airbag. In this hypothetical example the injury protection given up by reducing car size from 4,000 pounds to 2,800 pounds is regained through the use of an airbag.

For example, we have bought 1,200 pounds of car size protection for a driver with a 10 pound airbag system. Although, car size is being lost forever for fuel economy reasons the protection it provided can be retained. This holds true whether or not a seat belt is worn as well as seen below.

Obviously the equivalence between vehicle weight differential and the airbag is not exact. In some crash situations the 2,800 pound airbag equipped car would be superior to a 4,000 pound car whereas in others it would be inferior.

Nevertheless, the point is valid that from this perspective the airbag can be highly cost effective.

As an example of car size safety trade off consider a company vehicle fleet. The company which formerly provided its drivers standard size cars has now switched to intermediates or compacts.

The company could "buy back" the safety given up by installing driver air bags at a cost of approximately 5 percent of the vehicle price.

This same injury versus crash severity concept can also be used to illustrate that an air bag is a complementary system to a seat belt restraint.

In the next figure curves are shown for the 2,800 pound car with and without seat belts. Again it is well known that failure to use a seat belt increases the risk and severity of injury in most crash situations.

On this same figure curves are now shown when an air bag is added to the vehicle. For the unrestrained occupant the air bag provided the same general level of protection obtained with the seat belt. For the restrained occupant (and perhaps this is a new concept to some the air bag has significantly improved the survivability or injury amelioration envelope of the vehicle.

Unfortunately in the United States the unrestrained occupant represents approximately 90 percent of the vehicle occupant population. Because of this the air bag has been viewed as a substitute rather than as a complement to the seat belt. In Europe in which most countries have mandatory seat belt usage the air bag is properly viewed as a means to significantly increase the crashworthiness of the vehicle.

In conclusion the air bag restraint system can be viewed as means to significantly increase the inherent crashworthiness of a specific vehicle regardless of whether or not the seat belt is used.

In particular when viewed as a means to obtain a level of crashworthiness in a small vehicle which is only obtainable in a larger car (without an air bag) it becomes particularly attractive from a cost benefit stand point.

The air bag has suffered greatly from being oversold as an end all solution to the serious public health problem of automobile crash injury and fatality. Furthermore undue and unfair criticism has been heaped upon the air bag in efforts to defeat attempts to have it federally mandated (directly or indirectly).

Romeo Kojiyo is not in favor of legislation which would once again try to force its introduction. Rather, we would prefer to see the federal government institute programs which would encourage automobile manufacturers to provide for its availability.

The NHTSA can help significantly by continuing its present attempts to co-operate in the development of safer automobiles with the automobile industry and specifically by continuing its vehicle assessment crash testing program.

An air bag equipped car in which the air bag has been provided to improve the crashworthiness of the vehicle (in other words where seat belts are still provided and the dummies are still belted) should produce such good results in 35 mph and even 40 mph crash tests that manufacturers would be strongly encouraged to provide them as an option.

Finally, we believe that the greatest chance for growth of the air bag as a means to significantly contribute to the serious international health problem of automobile related injury and fatality is through intelligent, voluntary, controlled introduction into the market place. This is presently being done in Europe.

Nearly all vehicle safety improvements be they tires, brakes, suspension, steering, vehicle structure or most notably seat belts have been introduced into the American market place by imported European automobiles. Unless beaten this time by the Japanese it appears the air bag once again will follow this same route.

